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The Institute Abroad.*

AN UNOFFICIAL SKETCH BY THE SECRETARY.

It is impracticable to prepare for the present number of the *Bi-Monthly Bulletin* a detailed account of the memorable joint meeting of the Iron and Steel Institute and our Institute, held in London, the last week in July, and of the innumerable festivities, entertainments and excursions which accompanied and followed it, in England, Scotland, Wales and Germany.

* * * * *

I shall present here no consecutive and minute story, but only a series of general paragraphs concerning different aspects and stages of our experience.

THE WEATHER.

The proverbial good fortune of the Institute attended its visiting members and guests at every stage of the late London meeting and the numerous excursions which accompanied or followed it. Even the process of crossing the Atlantic was made delightful by smooth seas, through which the great modern transatlantic liners made their way without disagreeable evidences of progress. This was the case, so far as I can learn, with every Institute party of pilgrims. No racks on tables; no sloppy decks; nothing worse than an occasional use of the fog-horn. Marconigrams flying to and fro between ship and shore, or bearing greetings to passengers on other ships; telegraphic news of the world bulletined daily. In short, the ocean passage was a delight.

And we gathered in London to enjoy such unbroken fair weather as surprised the natives. Day after day of sunshine and balmy air gave to the great metropolis an additional charm. Apart from one or two passing showers, not a single detail of the London program was marred by unfavorable skies.

And this good fortune continued for a month, covering the week in London, the week (excepting one showery day) in northern England and Scotland, the interval of a week which followed, and the final excursions in the Rhine country and Hanover. This last period included one rainy day, but it rained while we were under cover, only to make our outdoor experiences the more refreshing.

Such plans as were made for our entertainment in England, Scotland, Wales and Germany are always largely dependent upon the weather, and the climate of that part of the world is not to be reckoned upon beforehand. It is, therefore, matter of special congratulation that this latest Institute outing became, through the blessing of Heaven upon the arrangements of Earth, all that our generous hosts had hoped to make it.

THE SESSIONS.

Long before the day of meeting, it had become evident that the technical sessions provided for would give no adequate opportunity for the presentation and discussion of papers. To the "joint meeting," the Iron and Steel Institute furnished a considerable list of important contributions; and our Institute presented a still larger number, appropriate to the occasion. The president of each society read a presidential address, and some time was necessarily given to formal business. The total time which the overwhelming hospitality of our British brethren had left for technical sessions permitted one session of the Iron and Steel Institute, one of our Institute, and one to be divided between them. It may easily be inferred that little could be done in the way of reading papers. Even the little which the secretaries had expected to do was further diminished by unpremeditated discussions, etc. The room was crowded (about 600 members of the Iron and Steel Institute being in town); and everything favored discussion, except the lack of time. The sessions were highly interesting; the subjects presented were burning questions of modern practice; and those who, like myself, lamented the impracticability of a calm and leisurely interchange of views among the eminent authorities and captains of industry who were present, must comfort themselves with the reflection that the valuable essays prepared for this meeting would not have been written without such a stimulus, and that the valuable debates which did not take place in the hall at London will take place (are, indeed, already in progress) through the more deliberate process of correspondence and publication.

The sessions were held in the stately hall of the Institution of Civil Engineers, on the walls of which hung the portraits of the past presidents of that illustrious society. Some of them I had seen in life; for nearly fifty years ago I had accompanied Sir Charles Fox to a meeting of the Institution of Civil Engineers, and had met there the famous Brunel, Scott Russell, and other great men in the profession. Now their faces were on the wall—and the grandson of one of them was shaking my hand in welcome.

THE KING.

H. R. H., the Prince of Wales, was for many years an Honorary Member of the Iron and Steel Institute; and Edward, King of England, is now carried on its catalog as "patron." In view of the favor he had always shown to that society and its great work and purpose, the council determined to confer upon him, this year, the Bessemer Gold Medal—which it had similarly given to Queen Victoria in 1899. The King, having signified his acceptance, the ceremony took place at an audience given to a delegation of officers and past-officers of the two institutes. On this occasion, the proceedings were perfectly informal. The King, in simple morning dress, without insignia of any kind, entered the room in which we were assembled; we were individually presented to him by President Hadfield; he shook hands with each of us, saying he was glad to see us (or words to that effect); Mr. Hadfield presented the medal, with an address of perhaps a dozen lines, comprising one or two sentences; the king replied that he was happy to receive this token from the representatives of so important an industry and the ceremony was over. Then His Majesty asked a few cordial questions of Mr. Hadfield, who told him in reply that his society was endeavoring to return to their American visitors some of the abundant hospitality it had received on two occasions in the United States, at which the King nodded approval, intimating that he had experienced American hospitality himself, and added: "I suppose you will show them a little of this country before you let them go home?" On being informed that we were to be taken to York, Middlesborough, Newcastle, Glasgow and Edinburgh, he expressed his satisfaction with that pro-

*From advance sheets of the *Bi-Monthly Bulletin* of the American Institute of Mining Engineers, for September, 1906.

gram, and said, "I hope you will have a very pleasant time." A little later, remarking, "Well, gentlemen, I will bid you good afternoon," he departed as he had come, and we thereupon departed as we had come (to wit, in President Hadfield's splendid automobiles); and that was all. Nothing could have been more simple, hearty and agreeable.

Seen thus at close quarters, King Edward appeared to be a stalwart, healthy, intelligent and dignified and kindly gentleman; not needing to be pompous, in order to show himself great; completely at home in whatever circumstances, and instinctively able to put others similarly at ease; able to command without shouting, and to influence without either deceiving or dictating. And nothing is more striking than the absolute and universal unanimity with which all classes, denominations and parties in Great Britain hold and declare this opinion of their sovereign.

THE WEEK IN LONDON.

The multiplied and complicated details of arrangement were admirably handled by Secretary Brough, of the Iron and Steel Institute, and his unwearied assistant, Mr. Sidney. The headquarters at 28 Victoria street were a rendezvous for members, with writing room, post office and intelligence bureau attached. Everybody's choice was ascertained, recorded and provided for.

Of course the week in London was a strenuous one. Every hour was occupied with an invitation to some new festivity. Private dinner parties; the brilliant reception of the lord mayor at the Mansion House; the great banquet at the Guild Hall; the fêtes at the Crystal Palace and at Earl's Court; excursions to Windsor, etc.; visits to sundry points of interest in and about London, and to great industrial establishments—all of which will be duly set forth hereafter in official style—crammed the days with "pleasure, amounting to fatigue!" But everybody soon discovered that he could not take in everything, and live; so there was still a goodly company in excellent condition for the breezy and refreshing trip to Dover harbor, on Saturday.

THE NORTHERN TOUR.

The northern tour, which began on Monday, July 30, and ended at Edinburgh on Saturday evening, Aug. 4, was a series of cumulative interest and enjoyment. The general and local programs had been so skilfully designed as to give us samples, as it were, of the various kinds of attractions which Great Britain possesses for Americans—scenery, castles, cathedrals, historic associations, antiquities, etc., as well as great works of modern engineering, industrial establishments and educational institutions. Thus we could inspect at York the medieval and Roman remains and the Norman castle, as well as the great Minster, with its windows of unutterable glory, while a portion of the party, by an easy detour, visited the famous Caseby main colliery. While some visited this or that one of the great steelworks which line the Tees at Middlesborough, the ladies were specially conveyed to Fountain's Abbey, and gracefully entertained there; after which, the re-united party spent a reverent and instructive hour in the cathedral of Durham. On Wednesday, three excursions started from headquarters at Newcastle-on-Tyne: one to the works on the river; one to the Hylton, Dawdon and Horden collieries; and one to Bamburgh and Alnwick castles. On Thursday, a similar division offered two alternative excursions; one to the Chesters and Borovicus camp, involving a drive of 28 miles along the old Roman wall; the other to the Elswick works, constituting the ordnance department of Sir W. G. Armstrong, Whitworth & Co., Limited. Glasgow furnished on Friday an entirely new and fascinating pleasure, in the trip upon the Clyde and through the wild Highland scenery of the marine lochs and sounds which repeat on a larger scale the inland features of the neighboring Trossacks. And finally, Edinburgh, besides regaling us with her own beauty and charm, introduced us to Dumferline, where we admired the splendid work of the Carnegie Trust (the sort of "Trust" to which nobody objects!) and went a bit daft oursel's over the magnificent marching, playing and dancing of the pipers of the 6th V. B. R. H. ("Black Watch") regiment. To this bare and partial outline should be added many particular features of social courtesy—banquets, lunches, receptions, addresses of welcome, music, flags and flowers—and all in an atmosphere of uninterrupted watchful care for the comfort and welfare of the party.

THE CARDIFF MEETING.

It was hardly to be expected that any of the American delegation would be drawn away from the attractions presented by the northern tour; yet there were a few who accepted the cordial invitation of the Institution of Mechanical Engineers, and attended the Cardiff meeting of that society, July 30—August 4. It was found impossible afterward to convince these stragglers that they had not had a better time than the main party. Their chief reason for their confident opinion seemed to be that they could not possibly have had a better time than they did have in Wales—so there you are! We said the same thing in support of our view; and both sides rested—with no verdict to follow!

THE EXCURSION TO GERMANY.

The interval between August 4 and August 13 was spent by individual members and their friends as pleasure or business suggested. Some accepted the hospitality of new or old friends in England; some "motored" through England; some coached in the Trossacks; some skipped over to Holland, and approached Germany by peaceful canal routes; some went to Windermere and some back to London for certain sights overlooked in the first mad week. But a goodly number—something over 100 (many more than had been at one time hoped for)—turned up at the rendezvous, in Düsseldorf, on August 13th.

This supplementary visit, planned by the Society of German Ironmasters, and carried through with unqualified and brilliant success by Dr. Schroedter, the executive officer of that body, was just what was needed to crown the experiences of our memorable month. It was a series of charming, varied, interesting and instructive reunions and excursions, exhibiting in equal measure the lovely scenery, the industrial progress and the warm hospitality of Germany. No part of the world more readily lends itself to such a proceeding than the region of the Rhine; no people know better "how to do it" than the people of that region; and we saw both land and land's folk at their very best, in those five golden days in and about beautiful Düsseldorf, along the storied, vine-clad Rhine and through the famous Bergenland!

Only 28 of us were able to take part in the supplementary visit to Hanover and the Harz, organized by Dr. Weiskopf and his associates of the Hanover special committee. If we had but known, months before, that the Prussian government, as well as private owners, would throw wide open to us the doors which not even natives have been permitted to pass—the doors of all mines, smelting works, etc., in the classic old home of these industries—we would have managed somehow to stay abroad long enough to avail ourselves of this almost unprecedented opportunity. But it was impossible, this year, to give up one's steamer accommodations and secure any others within a reasonable period; so we had to abide by our schedules of travel, and tear ourselves away. Those who remained longest were happy then, and are boastful now. The rest are hoping for a future opportunity. In Hanover, as in Düsseldorf, the Ladies' Committee was congenial and cordial and dear, and "too lovely for anything" —so said our ladies, and so say we all of us!

P. S.—During the drive of August 2, along the old Roman wall, the secretary had a perilous and somewhat spectacular fall, which ought to have broken his neck and smashed his ribs or his collar-bone. Those who saw the performance, and have been kindly anxious as to his welfare ever since, are hereby informed that the injury was chiefly a laceration of the muscles of the right shoulder, and although at the time (and still, in lesser degree), painful, presents no alarming symptoms. In witness whereof, these lines have been written for the printer, without special agony, by the hand and arm belonging to the said shoulder!

R. W. R.

Gold Mining in Western Siberia.

BY L. TOVEY.*

In the JOURNAL of Sept. 15, 1904, J. H. Curle gave a gloomy forecast of the near future of Siberian gold mining and the possibilities of investment offered in this country for English and American capital. This called forth several able answers, based on practical work in certain private mining propositions, by Arthur L. Pearse (Oct. 27), W. W. Behr (Dec. 8), and E. Nelson Fell (Dec. 22), who have shown that Mr. Curle was not quite right in drawing general conclusions about a country as vast as Siberia, from information obtained from a few gravel mines in eastern Siberia.

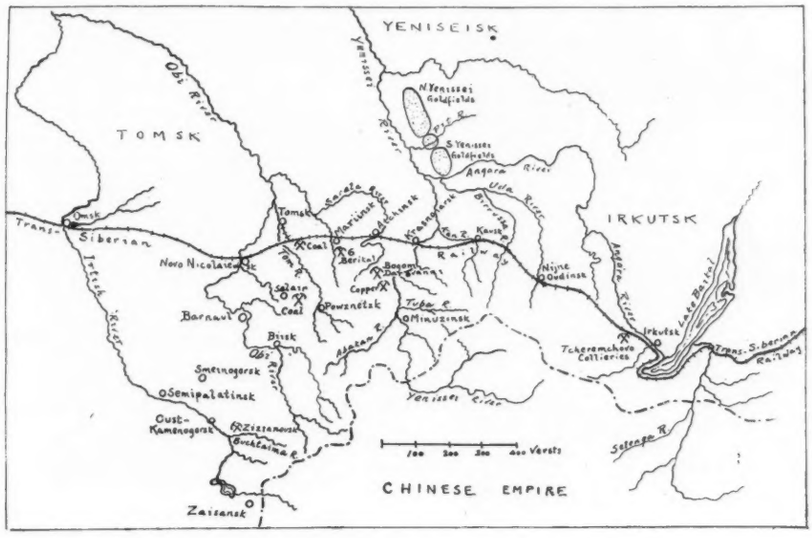

FIG. 1. MAP OF THE WESTERN SIBERIA GOLD AREAS.

Eastern Siberia, it is true, is still a gravel-mining country, as vein gold is worked only near Vladivostok (Askold island) and in two places in Transbaikalia. One of these mines is described by E. D. Levat in his "Or en Siberie Orientale," 1897, and the other is a new and promising property in the Shilka basin, worked by some English capitalists who were enlarging last winter their power plant by putting up hydraulic and electrical machinery and in general doing serious equipment work.

Much more important as a quartz-mining country is the western part of Siberia, the so-called Tomsk mining region, subdivided into seven mining districts inspected by mining engineers under the Tomsk Mining Direction. This region comprizes all western Siberia and the Yenissei Government of eastern Siberia. Here gold mining is at present in a state of transition from gravel to vein mining. Gravel mining is decreasing as steadily as quartz mining is increasing in nearly all the mining districts except the Yenissei, where quartz mining is not in favor among the local miners, first, because two very promising mines brought ruin to their owners in the early nineties (for reasons having no connection whatever with industrial conditions) and, second, because general attention is drawn to the very successful work of dredges. Some of these are of the New Zealand type, made by Cutten Brothers, introduced into Siberia by Goodkoff & Hein, of Krasnojarsk, and others are of the Bucyrus type, first introduced by J. L. Perelmann, of St. Petersburg, and built by the Putiloff Works at St. Petersburg. Hoping to return to dredging operations in Siberia later on, we will confine ourselves to general conditions of the industry and the further development of quartz mining.

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Data for the last five years have been compiled from the statistics of the Tomsk Mining Direction and those published by the Mining Department in St. Petersburg:

TOTAL GOLD OUTPUT OF THE TOMSK MINING DISTRICT.

Year.	Character of Mines.	Tons of Quartz or Gravel.	Output of Gold. Oz.	% of Total Outp't.
1900.	Quartz . ..	25,181	9,976	5.5
	Gravel. ...	7,201,455	171,816	94.5
	Tota'.....		181,792	100.0
1901.	Quartz	26,944	25,120	12.7
	Gravel.....	7,101,045	171,929	87.3
	Total.....		197,049	100.0
1902.	Quartz	25,483	26,811	18.5
	Gravel... .	5,493,823	118,195	81.5
	Total.....		145,006	100.0
1903.	Quartz.....	41,766	38,736	29.7
	Gravel.....	5,585,976	91,569	70.3
	Total.....		130,305	100.0
1904.	Quartz	61,420	49,654	38.0
	Gravel. ...	6,842,447	81,096	62.0
	Total.....		130,750	100.0

The above table shows a general decrease in the output of gold in the mining region, the difference between the output of 1900 and 1904 being 28.1 per cent. The greatest difference between two successive years is 26.4 per cent. between 1901 and 1902. The difference between 1902 and 1903 is only 10.2 per cent., while 1904 shows an insignificant increase of the whole output compared with 1903. The decrease of the total output is wholly due to gravel mining, as quartz mining shows a steady growth in output, the yield of 1904 being four times that of 1903.

FIG. 2. LOWER ADIT, CENTRAL MINE, MARIINSK DISTRICT.

Of the several mining districts where quartz mining has reached any importance, Mariinsk and Achinsk are successful producers, Oust-Kamenogorsk and Zais-

ansk are promising beginners, while the results obtained in the rich Minusinsk district are far from satisfactory. This last fact is due to the circumstance that most of the claims in that district both east and west of the Yenissei river are in the hands of penniless people who hope to

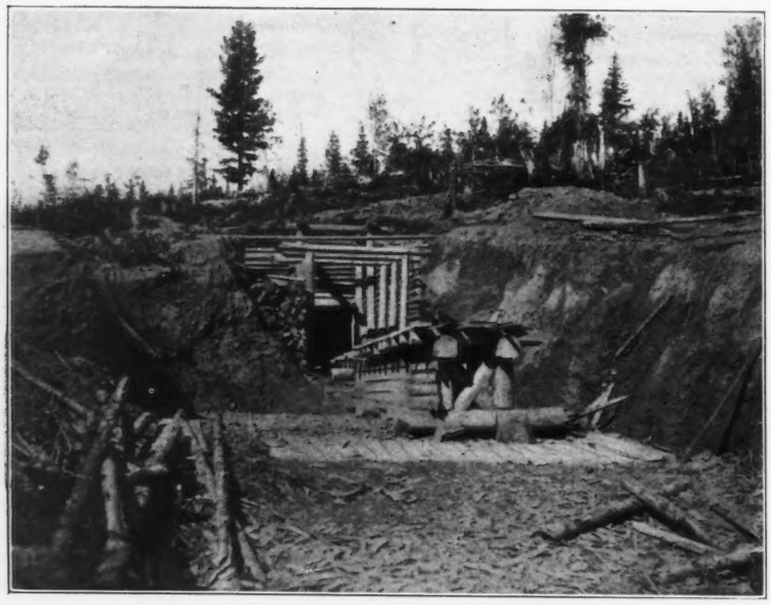


FIG. 3. UPPER ADIT, CENTRAL MINE, MARIINSK DISTRICT.

sell their claims, as they themselves are unable to do anything with their properties. During the last summer (1905) even the Minusinsk district has shown a considerable improvement and the Bogom Darovanni mine, named after the rich mine of K. T. Ivanitzki in the Achinsk district, seems to be a promising producer. In general, in spite of the war with Japan, which closed the Siberian railroad for almost all private goods, and consequently greatly retarded the delivery of new equipment for the gold mines, the industry has not stopped increasing, and there is every reason to expect that, as soon as the country shall come to an end of its present inward troubles, gold miners will do their best to make up for lost time.

If from the statistics of the industry we pass to the conditions and methods of work we must notice that they are far from being perfect, though not quite as hopeless as some would picture them. As work is confined exclusively to the outcrops of rich veins, very little sampling is done, and this little is far from the systematic sampling to which miners in the United States, the Transvaal and Australia are accustomed. Another reason is that the richer mines are owned by people who work them on a moderate scale, confining themselves to the richer veins without troubling about treating tailings and concentrates. This is especially noticed in the gash veins that have been in some places extremely rich and have incited diligent search for more veins; as this surface prospecting was often successful it did not compel the miners to look deeper down nor to benefit by the work on the first discovered veins. The market price of mines is to a certain degree influenced by the last year's output. Certainly it is a very poor method of estimation and may be explained only by the gold miner's proneness to take risks. Quite lately there is a certain improvement even in this respect, as some of the richer miners find it useful to estimate their ore reserves in order to control their outlay on equipment. Others find it even useful to employ a mining engineer to make an estimate of the mine before taking an interest in it.

Mining plans and vertical sections of gold mines are kept more or less in good order, as a plan, to the scale 1 : 500, is required by the mining code. Besides this, every claim has an official plan to the scale 1 : 8400, or 1 in. to 100 sagenes (1 sagene = 7 ft.) delivered to the owner by the local inspector of mines, and serving as a proof of the rights to the ground. Besides these compulsory plans, most of the owners have working plans to larger scales, but these seldom contain systematic data about the character of the deposit and the value contained. As local mining congresses and the consulting office of gold and platinum miners with members elected by the local congresses, having its seat in St. Petersburg (Nesvki persp. 56), have of late paid considerable attenion to the question of mining plans, there is reason to hope that in a few years most of them will adhere to a general standard.

As most of the mines in the Mariinsk and Achinsk districts can be worked by adits from gulches, almost no pumping is required. As timber is not dear, timbering in the mines is more or less satisfactory; in some cases, however, there is a certain overtimbering, especially in the stopes. In veins not thicker than 7 to 8 ft., stoping, without filling the stopes with rock, though not desirable, can still be tolerated; but when the vein reaches 20 ft. or more, this method is to be condemned in the most resolute manner, so much the more since filling is not more difficult or expensive than the extra timber used when the stopes are filled with cribs. Some of the miners working thick veins have come to understand this necessity, and are beginning to fill the stopes with waste rock. Breaking of the rock and ore at present, while the properties are worked from the outcrops, does not offer any difficulties, as these are in most cases considerably weathered. In several

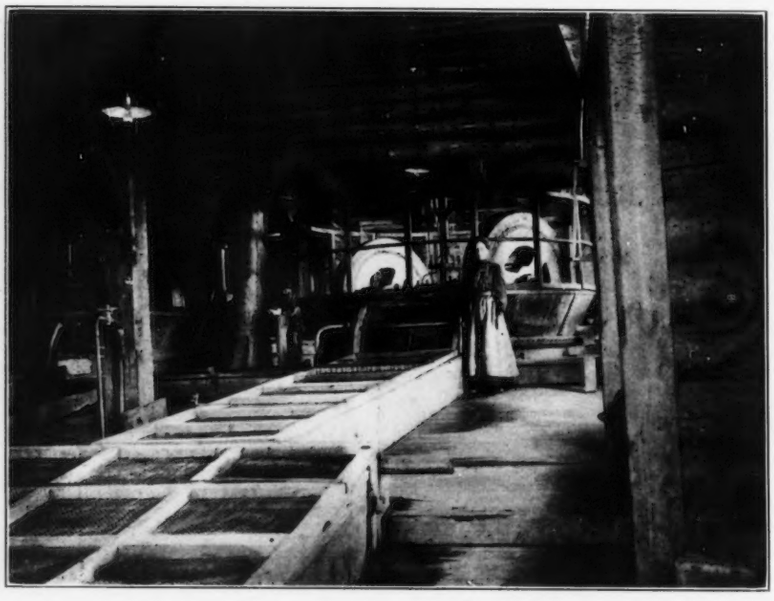


FIG. 4. CHILEAN MILL, CENTRAL MINE, MARIINSK DISTRICT.

of the properties, however, where the quartz and diorite are fresh and very hard, machine drills are being introduced; in the Sarala Yeis district, L. B. Brown has introduced three Ingersoll drills worked from an Ingersoll compressor. Mr. Ivanitzki is putting up an Ingersoll compressor and ten drills at the Bogom Darovanni mine in the Achinsk district. In the Mariinsk district the Sixth Berikal mine is worked with electric drills of the Thomson-Houston type. As none of these machines is expensive, there is every reason to expect that their universal adoption is a question of only a few years.

FIG. 5. MILL BUILDING, CENTRAL MINE, MARIINSK DISTRICT.

The securing of explosives, during the war, was difficult, mainly owing to irregularity of traffic on the Siberian railway. Even at that time, however, it was possible to get explosives from the Urals by steamer along the river Ob to Tomsk, and thence to the mines in autumn or winter by sledges. With a certificate of the mining inspector, an order for a carload of dynamite, by the Siberian railway, could be obtained, even in time of war, without much trouble. The prices for explosives in the Tomsk and Achinsk districts are not much higher than in the Urals, especially when quantities of 5 tons and more are supplied at once. Recent prices paid for a similar quantity were: For 86 per cent. dynamite, 35 roubles per pood (50c. per lb.); for 93 per cent., 38 roubles per pood (54c. per lb.); percussion caps with 1 gr. mercury fulminate, 25 roubles (about $1.25) per hundred; 25 ft. of waterproof fuse, 60 copecks (about 30c.).

In order to have a regular supply of explosives near the center of the mining area, arrangements are to be made to keep a storage magazine with about 30,000 kg. of Nobel dynamite in the Achinsk district. Explosives regulation is temporarily in a difficult phase owing to the internal revolutionary activity, but, as the ministry of finance is doing all in its power to increase the output of gold, there is every reason to believe that gold miners will be favored; even now, if a firm can show that it requires dynamite for lawful use in exploitation, or even in prospecting, no difficulty is experienced in obtaining the necessary permits from the mining inspection.

The broken ore is usually trammed down the adits in wooden mining cars, sometimes home-made, sometimes foreign. The Arthur Koppel type is much in favor. Surface haulage is very imperfect; it is done in *tarataikas*—one-horse carts on two wheels—as can be seen in the illustration of the lower adit of the Central mine, Fig. 2, in the Mariinsk district. In winter the *tarataikas* are replaced by wooden boxes on sledges, but snow storms make the haulage sometimes very difficult. To obviate this difficulty, at one mine in the Sarala district, Achinsk, a covered incline for mine cars extends from the mine to the foot of the hill where the mill is situated. K. T. Ivanitzki is putting up a wire-rope aërial tramway of the Bleichert type for a distance of a little over three miles at his Bogom Darovanni mine in the Achinsk district; the machinery is already at the mine.

The milling of ores is the least elaborate part of the operation, as, with one exception—the Sixth Berikal mine—the tailings are not treated. The older and richer mines, however, hope to start cyanide and chlorination plants in the near future, as the heaps of sands accumulate fast and, with deeper sinking, the quantity of pyrites increases. Till now, pyrites are concentrated only at the Sixth Berikal mine, where Stein-Bilharz tables are used for this purpose.

The crushing is done by mills of two different types—the Krupp stamp-mill, and the Urals edge runners (something like the Chilean mill); lately the Chilean mills have been sometimes supplied also by Fried. Krupp Gruson Werk, Magdeburg-Buckau, represented in Tomsk by the technical and industrial bureau. Some of the miners have recently been getting machinery direct from Krupp.

Some data about typical Siberian mills may be of interest. In the Mariinsk district the largest mine has four Chilean mills, one of which is represented in Fig. 4, the mill house in Fig. 5. The weight of each roller is about 4 tons; with 12

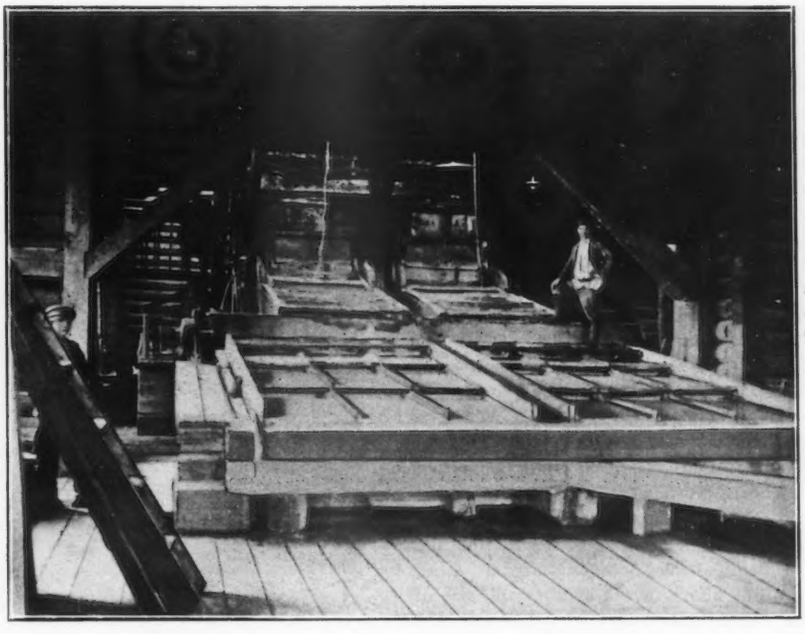


FIG. 6. ONE HALF OF THE 20-STAMP MILL, BOGOM DAROVANNI MINE.

r.p.m. the duty of one mill with two rollers per day of about 20 hours is from 12 to 14 tons of moderately hard quartz and beresite; the screens have 400 apertures to the square inch. The plant is run by a 40-h.p. Tangye engine. Krupp automatic feeders are to be installed between the Krupp jaw-breaker and the mills; temporarily the ore was conveyed from the breaker to a bin from which it was shoveled into the mills.

FIG. 7. BOGOM DAROVANNI MILL, ACHINSK DISTRICT.

The rollers and mills were supplied by Thomas Yates, of Ekaterinbourg, in the Urals. Bed-plates of chilled cast iron can be had from the Gurievsk iron works belonging to the Imperial Cabinet and situated in the Kouznetzk district of the Government of Tomsk, and distant about 150 miles from the center of the Mariinsk gold mining district. Contrivances for saving mercury, like those described on page 773 of R. H. Richards' "Ore Dressing," have been put up and give very satisfactory results. Besides the main engine of the mill there is a small steam engine to run the dynamo for lighting. As the amount of tailings accumulated in dumps near this and two old stamp mills of a neighboring claim worked for over twelve years is considerable, a cyanide plant is to be put up shortly. The output of this mill for 1904 was 13,079 oz. gold from 10,271 tons of quartz crushed, an average of 1.27 oz. per ton of ore.

Most of the smaller plants in this and the neighboring Achinsk district differ from the above by the number and size of the roller mills and the nature of the motor. When plenty of water is at hand, simple water wheels are used. In one of the larger properties on the Sarala the Chilean mills are placed by twos in two different buildings at a short distance along the same gulch, in order to use the water a second time. The upper two mills are run by an Escher Wyss turbine, the lower by a Queva.

The Bogom-Darovanni mill in the Achinsk district, near the mouth of the Fedorofski Klutch, a small tributary to the mountain stream Sobaka, is of a quite different type. It is a twenty-stamp Krupp mill, as seen in Figs. 6 and 7. The weight of stamps is 1040 to 1280 lb.; speed, 90 drops per minute; hight of discharge, 7 in.; screen, 720 to 900 apertures to the square inch; duty per day of 20 hours, from 25 to 32 tons, or, on an average, about 1½ tons per stamp of very hard quartz with diorite. The mill is activated by a Girard 60-h.p. turbine, or, when water is scarce, by a 54-h.p. Tangye engine. A general view of this mine is shown in Fig. 8.

As the development of the mines of the Bogom Darovanni and neighboring claims promises a larger output of ore than the mill can manage, another plant of four Chilean mills run by Pelton wheels is going to be put up; ditches and flumes from the neighboring main stream Sobaka, and masonry works for the mill, are in construction. A cyanide plant is also to be put up in the near future; the masonry work for it is ready. The output of the mine for 1904 was 10,649 oz. gold from 8874 tons of quartz crushed, an average of 1.20 oz. to the ton.

The above two mills are the largest and best equipped in Western Siberia. Other important mills in the Mariinsk district produced in 1904: Sixth Berikal, 9477 tons crushed, 9460 oz. gold recovered; G. M. Miller mine, 4358 tons crushed, 1934 oz. recovered. In the Achinsk district, nearly the whole of the remaining 9600 oz. was produced by three mills.

In general, the aspect of gold mining in Siberia is far from discouraging, and, as soon as the present general political difficulties in Russia shall come to an end, a rush for the gold mines may be expected. There are many chances that this time it will cover most of the Siberian gold fields and not be a failure, like the local rush in the South Yenissei district in the eighties.

Prices and wages are somewhat higher in the gold-mining districts on account of the war and its consequences. Workmen of the first grade get 50 to 60c. per day; second grade, 35 to 45c. per day; skilled labor, 75c. per day; mechanics $30 to $37.50 a month; foremen $50 a month. Rye flour, 0.75 to 1c. per lb.; wheat flour, 2.5 to 3.5c.; meat, 2.5 to 3c.; sugar, 9 to 12c.; butter, 14 to 16c. per lb.

Still these prices are not unduly high, and not much different from those quoted in 1903 by L. B. Brown.

FIG. 8. BOGOM DAROVANNI MINE, WORKMEN'S QUARTER.

The Manhattan Mining District, Nevada.

BY CLAUDE T. RICE.

There are two ways to get to Manhattan, viz., via Austin and a two days' stage trip from there to Manhattan, which is the way that the mail from the East comes in; or by railroad to Tonopah and thence by stage or automobile to Manhattan. The automobile trip is made in 3½ or 4 hours each way and the round trip price is $35; the stage fare is $15 for the round trip and takes 8 hours each way (50 to 55 miles by road).

MANHATTAN, NEVADA.

Manhattan lies in the foot-hills of the Toquima range, about 35 miles north from Tonopah. After a warm ride across the desert valleys, which seem to be more sandy and dusty than those farther south, it is a relief to see the snow-tipped peaks of the distant range grow more distinct, until finally the stunted pines and junipers upon the foot-hills appear; and then, after leaving the monotonous bare hills of the desert, to wind about through hills covered with these scattered, scrubby trees and once again to smell the pines. In physical appearance Manhattan is an agreeable change from the bare regions surrounding Tonopah, Goldfield and Bullfrog. But, alas, water is a minus quantity in the near neighborhood of Manhattan. This camp is too young for even the boomer to think of piping water to it. However, an electric light system has already been completed, $2.50 per month being charged for each 16 c.-p. lamp. The electricity is generated by a steam-driven dynamo about three miles down the cañon. Things boom in Nevada. Water is hauled into Manhattan from near-by springs and at present sells for $1 per 50 gal., which is cheaper than at some other camps.

Ore was discovered in this new camp by John Humphrey. There was an old silver camp called Manhattan about six miles to the northwest, which was operated some 30 years or so ago. The original discovery of the new camp was made in April, 1905, on the April Fool claim, but it was kept quiet and made known only to a chosen few until finally it leaked out about January 1, 1906, when the rush began. Another Tonopah, another Goldfield, was the thought that fired everybody with enthusiasm. Automobiles, stages, private conveyances, all were crowded by prospectors and boomers. At that time the trip was made by the way of San Antone. Men unable to get a cot in a "tent-house" slept on the gaming tables in the saloons, i.e., after the gambling had stopped in the early morning hours. The accommodations were poor, but, by the end of February, wooden buildings had gone up, many tent-houses were erected and the town assumed the general appearance it has at present. But most of the ground had been already located.

SHIPPING ORE.

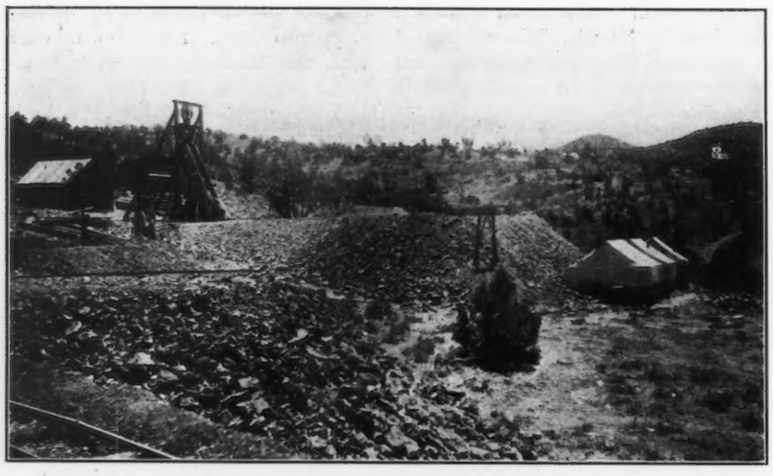
The later comers plastered locations on top of locations; the ground for miles around was taken up. Numerous stock companies were formed, and things boomed. Numerous leases were let. The first, on the April Fool, were let the last of August, 1905. Later, others were let upon the Mustang, the Stray Dog, the Union No. 9, the Little Gray, the Jumping Jack and the Indian Camp. Much work was done and a little high-grade ore, rich enough to ship, was found, but Manhattan soon proved that it was no leasing camp, although some of the lessees were and are still successful. The camp developed rapidly and everything was going on gloriously when the San Francisco catastrophe occurred.

San Francisco banks had advanced money upon the stocks of companies backed by Nevadans who had been successful at Tonopah and Goldfield. These stocks had been put on the market, but of course everything went down after the disaster at San Francisco, both the strong and the weak. Manhattan was suddenly brought face to face with financial hard times while still in the prospecting stage. So there are now none but paper mines at Manhattan; of the "prospects" there are some few good ones, and these, some almost mines, are being developed by people who have confidence in the camp. However, the development will be slow, for no large bodies of uncommonly rich ore have been found as yet to help urge matters on at the feverish pace of New Nevada. On the contrary, there are only high wages and high freight rates, which shackle progress.

Manhattan consists of a series of much altered sedimentary rocks, probably Cambrian in age, like those at Lida and Silver Peak. This series consists of quartzites, limestones, and shales, which last are almost slates. The series has been faulted, but as yet no igneous intrusions have been found near any of the ore deposits. Granites are said to surround the camp except upon the northwest.

There seem to be two main zones of mineralization at Manhattan, although pos-

sibly the April Fool group is a third and separate one; possibly, however, it belongs to the first, nothwithstanding the fact that its ores resemble those of the second zone more than those of the first. These two zones are different in character. The



RAYCRAFT LEASE, UNION NO. 9 CLAIM.

first zone consists of the White Cap vein, the Pine Mountain and Manhattan Consolidated veins, and the deposits which occur on Litigation hill. All these are bedded veins and are characterized by a highly calcareous gangue in which there is some quartz. These deposits seem to replace soft shaly strata immediately overlying strong banks of limestone, some of which are dolomitic in character. Large bunches of whitish calcite are characteristic of these veins.

The other zone is represented by veins sharply cutting across the strata, such as those of the Stray Dog, the Jumping Jack, the Union No. 9, and the Little Gray. All of these veins are characterized by a highly silicious, felspathic gangue. Some lime occurs in these veins and occasionally some manganese oxide. There is also a good deal of quartz, but the main value occurs in the whitish, felspathic, crystalline vein matter. The Mustang vein, though parallel with the bedding, has a felspathic gangue.

The best developed properties are those on Gold hill. The Jumping Jack vein has been opened up in the Golden lease to a depth of 80 ft. The ledge appears to be about 4 ft. wide and contains sufficient high-grade ore to make the lease profitable. The high-grade ore shipped is said to average about $250, but the bulk of the vein is only a good grade of milling ore.

On the Stray Dog is another of the few successful leases at Manhattan. Several leases were given upon parts of the Stray Dog, but with one exception these developed only small cross-fissures of high-grade ore and at present are not working. The successful lease is on the main Stray Dog vein, which runs northerly and southerly and dips about 55 to 60 deg. to the west. This vein cuts sharply across the country rock and passes into Union No. 9 ground on the north. This fissure is from 4 to 8 ft. and sometimes more in width. It contains considerable high-grade ore and a great deal of good milling ore. This vein has been opened up by lessees to a depth of 135 ft. on the veins by an inclined shaft. Short levels have been driven on the vein at the 50-ft. and the 135-ft. levels. The shaft is equipped with a locomotive boiler and steam hoist.

LITTLE GRAY CLAIM.

DRY WASHING.

On the Union No. 9 and the Little Gray several leases are being operated. The Union No. 9 is, at present, the most developed property at Manhattan.

Raycraft & McLean operate leases Nos. 9, 10, 11, 12 and 13 on Union No. 9, and have No. 11 on Little Gray. One can go down the shaft on lease No. 12, Union No. 9, and crossing on the 150-ft. level come up the shaft on lease No. 11, Little Gray, a distance on the vein of over 300 ft. Both the Union and Little Gray leases are opened up by incline shafts following the vein. Levels have been run on the vein at 60 ft. and at 150 ft. The ore is being blocked out and all the milling and shipping ore will be mined without sorting, as the lessees intend to erect a mill at a point three or four miles down the cañon where they have a sufficient supply of water.

Considerable ore was shipped from the Briggs & Evans lease (lease No. 14, Union No. 9), and on the dump, July 1, there was roughly 4000 tons of ore, said to average $37 per ton, this being the value after the high-grade ore was sorted out. The whole ledge is said to average about $78 per ton.

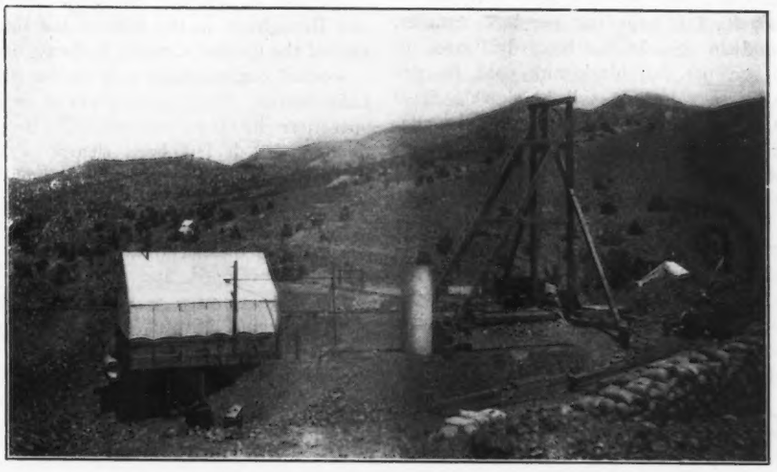
The Union No. 9—Little Gray vein—is a fissure cutting the formation and has a strike a little east of north and dipping to the west. This vein is 4 to 8 ft. in width (in places wider) and is of the same general character as the Stray Dog.

The Mustang company is sinking a vertical shaft, 7x4 ft. in the clear, which is timbered with 6x6-in. timbers and lagged with 2-in. planks. It will be used to develop a series of northeast-southwest veins, dipping to the northwest, developed in a few shallow workings done by lessees some time ago.

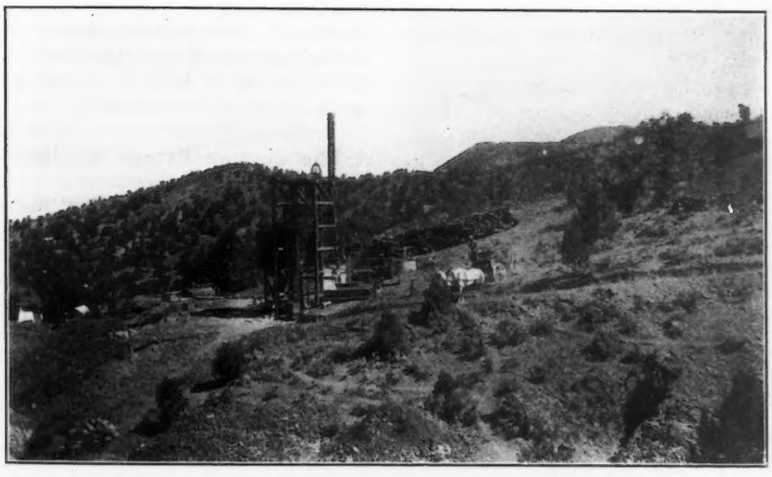
At the Indian Camp claim, several veins, which intersect near the shaft, are being developed. The surface showing at this intersection is promising. Two men with a Freeman dry-washing machine have been making good wages working the soil overlying this intersection and the soil on bed rock in the small dry gulch below the intersection.

The Manhattan Consolidated is developing a large bedded vein, which is rich. This has been crosscut in a tunnel 300 ft. long. This vein strikes east and west and dips about 54 deg. to the south. The tunnel cuts this vein at a point 112 ft. from the portal, the tunnel being in ore for a distance of about 30 ft. About 60 ft. farther, the crosscut intersects a second bedded vein, which it opened up for a distance. This vein is 6 to 8 ft. wide and is of rather low grade. The crosscut is being driven farther to catch another vein. In the south crosscut tunnel, on Litigation hill, near the portal there is a large and rich vein. A vertical shaft, sunk to open up the vein in depth, encountered water at 77 ft. All the Manhattan Consolidated veins are bedded veins having an east and west strike and a general dip below 45 deg. to the south.

The Pine Nut, adjoining the Manhattan Consolidated, is preparing to open up in depth the extension of one of the Consolidated veins in its territory. At this place also water was struck, at a depth of 85 ft. On the west side of the hill this company has a long tunnel, cutting diagonally through the strata, which has intersected a wide vein of ore going about $4 per ton.

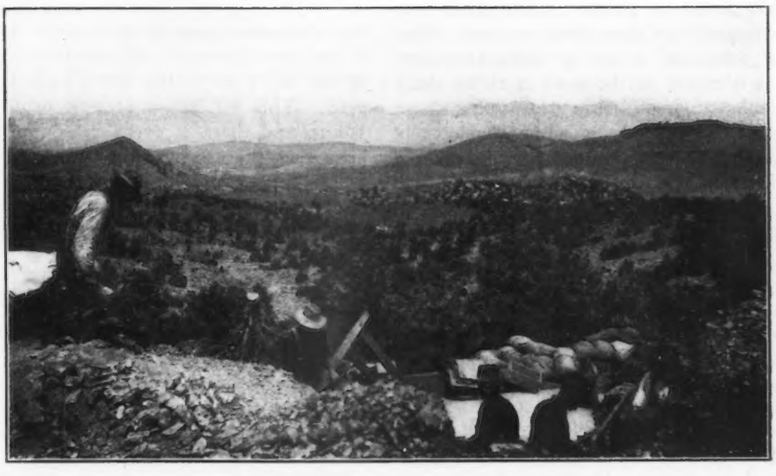


LITTLE GRAY SHAFT.



MANHATTAN CONSOLIDATED SHAFT.

On the White Cap an inclined shaft is being sunk on a bedded vein, which has an east and west strike and dip of about 70 deg. to the south. This vein is 5 to 6 ft. wide. It is characterized by much calcite in the gangue, which occurs in numerous large bunches. The ore at the surface was of fair grade, but it was cut off by a bar of calcite, below which the value is only $6 to $15 per ton. On the April Fool ground considerable prospecting for a good orebody has been done, but so far the ground appears to have been quite pockety. What is considered to be very promising ground is that upon Litigation hill. Injunction and counter-injunctions have been issued as a result of the tangle of conflicts, relocations, etc., and so this ground is tied up and no work is being done upon it.



SUCCESSFUL LEASE.

The wages at Manhattan, for eight hour shifts, are as follows: Miners, $4.50; miners on windlass, or in raises, or in shafts, $5; miners working for contractors, $6; hoisting engineers and blacksmiths, $5.50; carpenters, $8. The prices for supplies are as follows: Powder, 40 per cent., 18c. per lb.; fuse, per case of 6000 ft., $35; caps, 90c. per box; candles, Goodwin 40's, $7 per box; drill-steel, 16 to 17c. per lb.; blacksmith coal, 6c. per lb. in sack lots (145 lb.); shovels, $1.50 to $1.75 apiece; picks (Verona brand), $1.75 apiece; lumber, $75 to $80 per M. At present most of the freight comes in by way of Austin.

The cost of mining is not high as the ground is not especially hard, being mostly shale. Drifts have been contracted for at $4 per ft., the company furnishing the supplies, but generally it costs somewhat more than that. A dry shaft, 8x5 ft. in the clear, was sunk on contract by wind-

SELF-DUMPING BUCKET.

lass to a depth of 60 ft. for $10 per ft., the company furnishing powder, tools, etc.

Manhattan has a population of about 1500 people at present; formerly it was twice and even three times as large. How the population makes its living at present is a question, as the town is rather dead. Manhattan is still in a prospecting stage. Its future depends upon the development of its veins of milling ore, several of which are promising. Manhattan has been a great deal overestimated and has been much overadvertised. The resulting setback has begun. Its future is yet to be made, but as several companies are working in an honest attempt to develop mines and good reliable men are back of several of these ventures, the prospects do not look so bad as they impress one at first.

It has been supposed that cobalt would have effects upon steel similar to those exerted by nickel. Dr. Leon Guillet has proved this supposition to be unfounded.

Notes on the Production and Uses of Canadian Chrome Ore.*

BY W. H. EDWARDS.

Chrome iron is found in large quantities in the serpentine belt in the eastern townships of Quebec, between Disraeli and Broughton, in the hills to the southeast of the Quebec Central Railway, but it is worked commercially only in the Black Lake district. Until recent years no serious operations had been undertaken for its production, but it has been clearly shown that it should take a high rank among the mineral resources of the province.

There are several mines through the Black Lake district that are being successfully developed, and one, that of the Black Lake Chrome and Asbestos Company, has gone beyond the experimental stage and has become an important factor in the chrome trade of this continent. The company has a mill of 30 stamps for the concentration of the waste from their pits, and is producing a high-class chrome concentrate running 50 to 54 per cent. chromium sesquioxide, which is coming into direct competition with the high-grade Caledonia ores. Indeed all the chrome treated in this way through the district is of high quality.

The method of mining and treating the ore is the same throughout the district and is very simple. After it comes from the pit it is sorted and all that will run over 40 per cent. Cr_2O_3 is put aside as crude. This product is divided into two grades, all below 47 per cent. being No. 2 and all above it No. 1. The balance, or all ore testing below 40 per cent. and over 10 per cent., goes to the mill as waste. Here it goes through a jaw crusher and under the stamps. After it will pass through a 22-mesh screen it goes to the Wilfley tables; the best of the tailings from the tables are run on to another table and the resulting concentrate is called No. 2, having a percentage in Cr_2O_3 of 40 to 43 per cent.

It is not possible to state whether the ore in this district has the same formation throughout, as the only place where it has been followed for any distance is in the No. 1 pit of the Black Lake company. This pit has a present depth of 350 ft. and there is every reason to believe that the ore is in a vein and not, as has been thought to be the case in all chrome deposits, in the form of a pocket. The strike of the vein is about east and west; the dip is about 2 in 6, while the width has varied greatly. At the surface it was only 4 ft., at the 150-foot level it was 20 ft. and today at the 350-foot level it is 175 ft. The thickness has gradually increased from 3 ft. at the surface to 30 ft. at the 350-foot level.

The amount of chrome shipped from the Black Lake district during 1905 was as follows: Black Lake Chrome & Asbestos Company, 7800 tons; American Chrome Company, 225 tons; Canadian Chrome Company, 252 tons; Montreal Chrome Company, 200 tons; total, 8477 tons, or an increase of over 3000 tons over 1904. This has practically all gone to the United States, where the yearly consumption is about 80,000 tons.

*Extract from advance proofs, subject to revision, the *Journal* of the Canadian Mining Institute, Vol. IX.

Formation of Fume in Lead Smelting.

F. O. Doeltz and C. A. Graumann report in *Metallurgie*, III, xiii, 442, that galena is far more volatile than lead oxide, being volatile in a high degree at 860 deg. C. At that temperature, experiments showed a loss of 18 per cent. in weight in an hour. The formation of scaffolds of artificial galena in lead blast furnaces can therefore be readily understood. The fine needles of sulphide, which are found in the masonry of reverberatory furnaces, can also be attributed to the sublimation and condensation of galena.

Lead sulphate is only slightly volatile, but it is decomposed at a temperature of about 1000 deg. C., contrary to previous statements. The sulphate which is found in flue-dust chambers is due chiefly to the action of sulphur trioxide on lead oxide, or oxidation of lead sulphide.

The German Potash Syndicate.

It is only very gradually that the German Potash Syndicate receives new members within its fold, and the inclusion of the Friedrich Franz Gewerkschaft, which was approved at a general meeting of the Syndicate held in Berlin, on Aug. 13, says the *Chemical Trade Journal*, recalls the fact that the combination has not yet been able to arrive at an agreement with the owners of the Sollstedt works, nothwithstanding the differences which have existed for many months past. At the meeting of the members of the Syndicate at the beginning of last April, the question of the rivalry of this important outstanding works was fully discussed, and a resolution was ultimately adopted that, having regard to Clause 17 of the Agreement, the Syndicate could thenceforth be denounced at any time by members who had at disposal votes representing at least over a fifth of the total number of votes. The resolution also authorized the Administration of the Syndicate to adopt combative measures against the Sollstedt works in case of necessity, and it further gave expression to the determination of the members not to agree to a reduction in prices as a condition for the adhesion of this outstanding producer. It would thus appear that the owners of the Sollstedt works desire to bring about lower prices, so as to promote sales with the object of more readily disposing of the increasing production of potash salts.

The Siemens-Ilgner System of Electrical Mining Hoists.

BY J. W. H. HAMILTON.*

The description in my previous article gives a general outline of the characteristics of the various electrical hoisting systems. The Siemens-Ilgner system, which is characterized by the fly-wheel converter, has some details of sufficient interest to warrant a special description. Since the hoisting plant can be connected to any system of current distribution which may be desired, the motor of the fly-wheel converter can be built for either direct or alternating current. The characteristics of the direct-current motor make it preferable, though for certain reasons it can seldom be used. The variation in the speed of the converter, which is necessary in order to make the fly-wheel absorb and discharge energy, must be made without causing the motor to take a load exceeding its normal capacity. In case a direct-current shunt-motor is used, this can be accomplished without any loss of energy by changing the strength of the motor field. If the strength of the field is increased when the hoist requires power which exceeds the normal capacity of the converter motor, and the speed consequently begins to drop, the power taken by the motor from the line can be kept about normal. When the hoist requires less than the normal output of the converter, the surplus power of this motor is absorbed by the fly-wheel, which accelerates until it has obtained maximum speed. The change in the motor field is made automatically either by a centrifugal governor, or by a relay actuated directly by the main current. The latter has proved to be the better arrangement. Wherever a long transmission line is used, a direct-current motor is out of the question, and a three-phase motor is mostly used, in which case the normal load is kept on the motor when the speed changes by means of resistances connected to the rotor circuits. These resistances are also used for the starting of the motor. A certain amount of energy which is proportionate to the reduction in speed is always consumed by these resistances. When the load changes from zero to normal, the speed is usually allowed to drop 10 per cent. For maximum load, the speed will go down 15 to 20 per cent. If the motor, for instance, is built for 400 h.p., the 15 per cent. speed reduction will, while it lasts, cause a power of consumption in the resistances of $15 \div 100 \times 400 = 60$ h.p. This dissipation of power may be lessened in case the induction motor has a special winding which permits a variation in the number of poles, and consequently in the speed of the motor. The automatic changing of the resistances of the motor is accomplished by means of the same kind of apparatus as is used for the direct-current motor. The direct-current generator and the exciter are both shunt-wound, and have no special features.

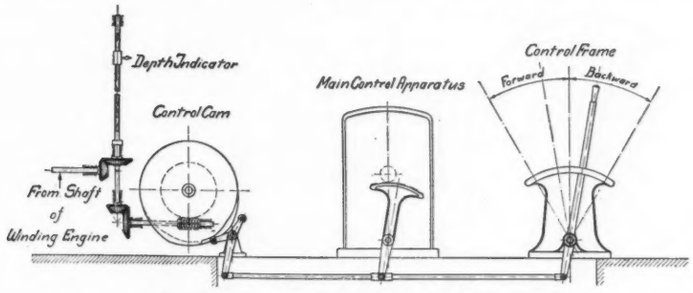


FIG. 1. SCHEME OF THE DEPTH INDICATOR WITH SAFETY GEAR.

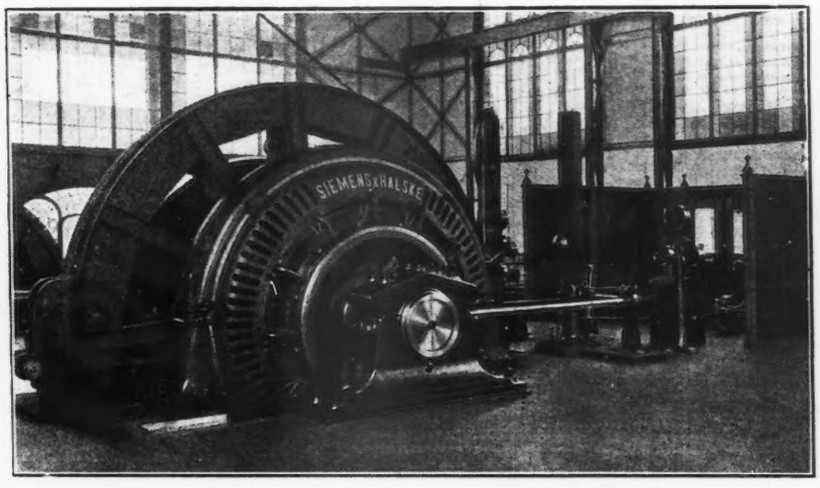


FIG. 2. HOISTING ENGINE, ZOLLERN II COLLIERY, AT MERKLINDE, WESTPHALIA, GERMANY.

The fly-wheel, which is made in one piece, of cast steel, must be dimensioned so that its inertia is great enough to balance all fluctuations of the load. The kinetic energy of a moving body being proportionate to the square of the velocity, the speed of the fly-wheel is kept as high as the strength of the material will permit. The diameter of the wheel can be 14 to 15 ft., and the number of revolutions is usually from 300 to 500 per minute, while, for good steel castings, a peripheral speed of 260 ft. per second can be allowed. Its kinetic energy is usually great enough to carry the maximum load of the hoist from the bottom of the shaft to the top. Fig. 3 shows clearly how well the fly-wheel is able to equalize the load. The curves are plotted from readings taken during a test of the fly-wheel converter operation. While the load of the gener-

FIG. 3. CURRENT-DIAGRAM, HOISTING ENGINE OF THE ZOLLERN II COLLIERY.

*Consulting mining engineer, 29 Broadway, New York City.

ator changes from about + 2000 amp. to — 1000 amp., the load of the motor is held within very narrow limits. The negative sign indicates that the generator has absorbed energy; i.e., it has run as a motor and returned energy to the fly-wheel: consequently the hoist motor has acted as a generator.

This motor, which is shunt-wound with separately excited field, is, whenever possible, connected directly to the drum shaft. As no special kind of drum is required for this hoist, the cylindrical and the conical drums can be used as well as the Koepe pulley. The Koepe pulley is, on account of its lightness and inexpensiveness, coming more and more into use. A hoist with these pulleys is shown in Fig. 4. When two hoist motors are used, in which case they can be run either in series or in multiple, thus allowing a wide variation in the speed, they are usually mounted one on each side of the drum on a common shaft. Another arrangement is shown in Fig. 6, where the motors are mounted one above the other on separate shafts. This makes a very light construction, and it is therefore possible to mount all the hoisting machinery on the pit-head gear.

In order to show the flexibility of the Siemens-Ilgner system, it may be pointed out that any existing steam hoist can be readily adapted for working on this system. A steam hoist converted in this manner is shown in Fig. 7. It is usually important to have a change of this kind made without stopping the engine for any length of time. It has sometimes been done without interfering with

DAILY OUTPUT:
1000 tons lifted 1600 feet (500 m) in 9 hours of actual work
Number of trips: 46 per hour
Number of Wagons: 4 per trip
Load: 2 tons 7 cwts. (2400 kg)

SPEED:
Medium: 26 ft. (8 m) per second for material
Maximum: 39½ ft. (12 m) per second for material; 16½ ft. (5 m) per second for men

MOTOR:
Normal output: 480 HP
Revolutions: 46 per minute

PULLEY:
Diameter: 16½ feet (5 m)

ROPE:
Diameter: 1.575 in. (40 mm)
Diameter of wire: 0.1 in. (2.5 mm)
Number of wires: 114.
Breaking strain: 99 tons (100300 kg)
Factor of safety: 10, with rope having a breaking strain of 114 tons per sq. in. (180 kg per sq. mm)

SWITCH APPARATUS:
a. High tension switch box
b. Flywheel-starting machine
c. Starting switch and resistance
d. Switchboard for continuous current

CONTROL APPARATUS:
e. Lever frame
f. Starting and regulating gear
g. Commutator.
h. Oil dash-pot
i. Depth indicator with safety apparatus
k. Ammeter and voltmeter

BRAKES:
l. Working brake (compressed air).
m. Compressed air receiver
n. Compressor
o. Safety brake
p. Lifting arrangement for the safety brake, with emergency switch

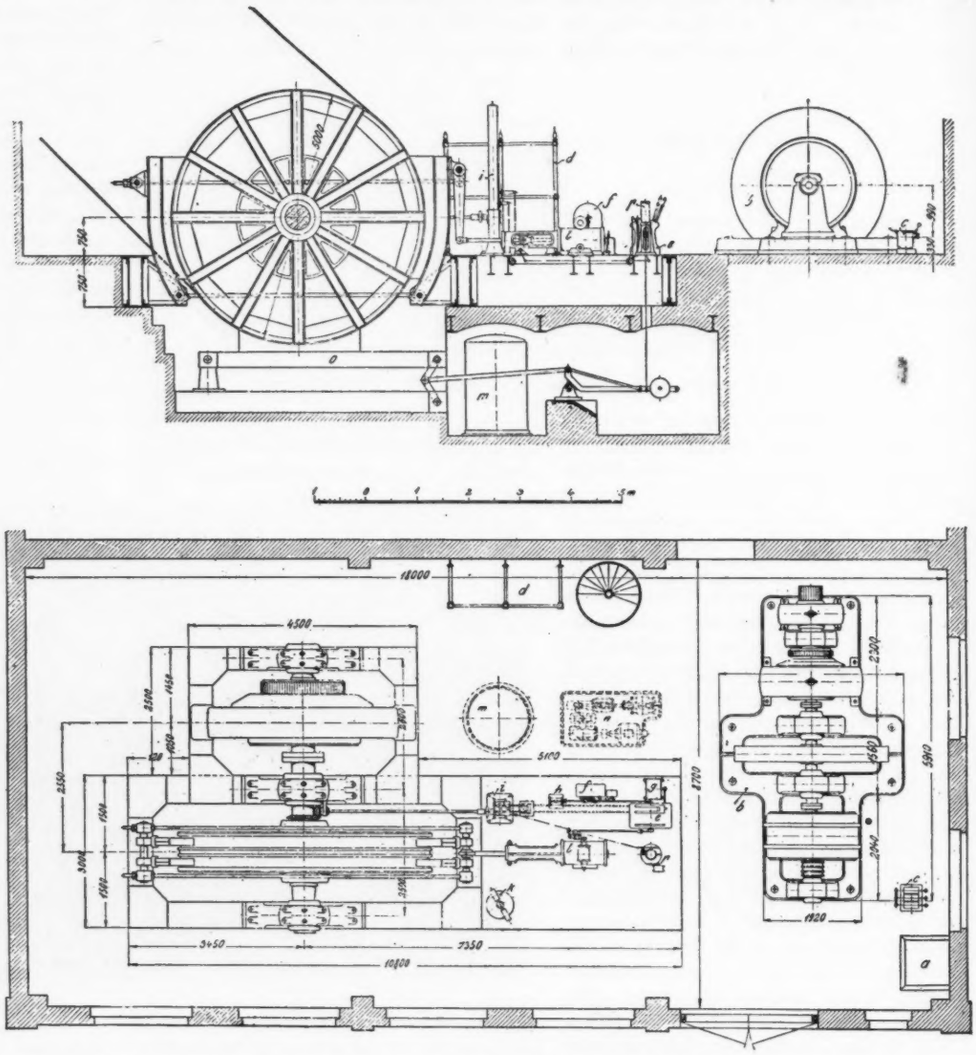


FIG. 4. HOISTING ENGINE, SIEMENS-ILGNER SYSTEM, WITH KOEPE PULLEYS.

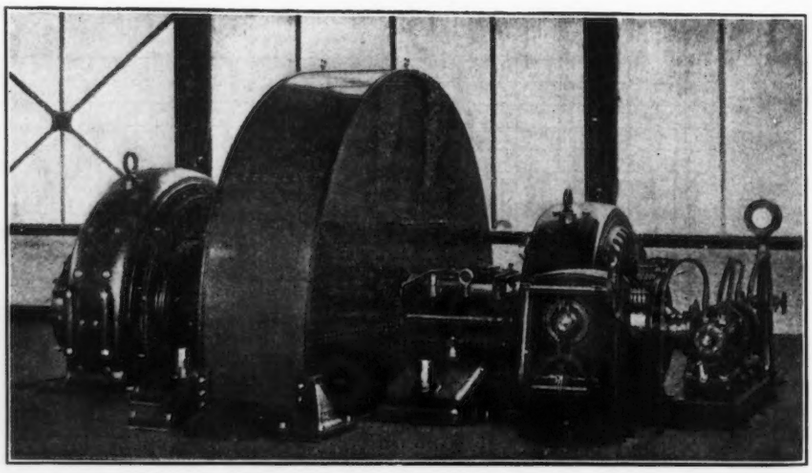
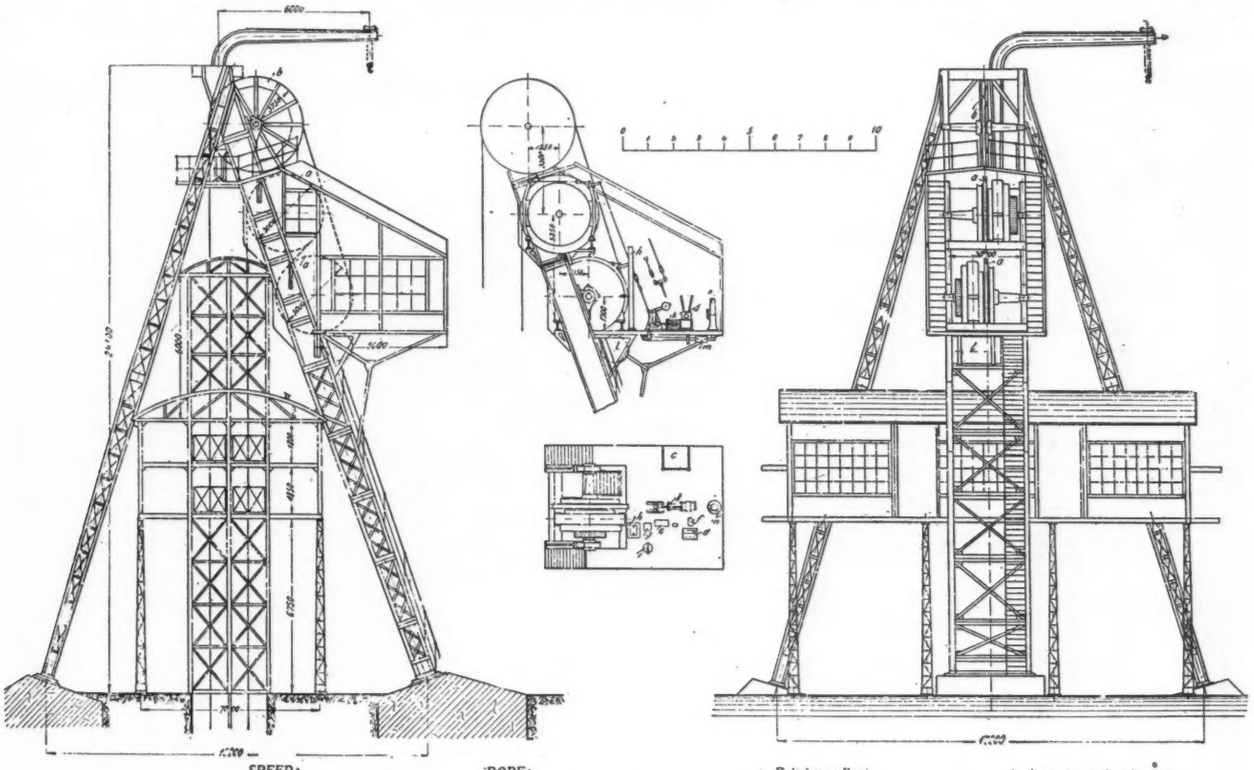


FIG. 5. FLY-WHEEL CONVERTER, HOISTING PLANT OF ZOLLERN II COLLIERY AT MERKLINDE, WESTPHALIA, GERMANY.

the working of the hoist more than two or three days. The methods employed can be easily understood from the illustration. A crank is mounted on the shaft of the motor, which can be put in position ready to be connected to the engine crank by means of a link. The motor crank, being longer than that of the steam engine, does not interfere with the connecting-rod of the engine. When the motor has been mounted on its foundation and everything is ready for the change, the steam engine is shut down, its connecting rods are removed, and the link between the crank pins of the engine and the motor can be fitted in a short time.

the tank is placed near the hoist to insure quick action of the brakes and reduce friction losses in the pipes. In order to prevent mistakes on the part of the operator, the motion of the control lever is checked by means of a cam which is synchronized with the hoist and the depth indicator. While the cage makes a complete run from the bottom of the shaft to the top, the cam makes one revolution. The cam consists of two disks, the function of which can be clearly understood from Fig. 1. When the hoist is to be started, the control lever is pushed forward until the roller strikes the cam, the hoist starts, and the cam begins to revolve; then the

it allows the operator to move the controller arm, and he is therefore able to use his own judgment in landing the hoist. Should he, however, forget to stop it when the bank has been reached, the cam would quickly force the control lever into the off position and the brakes would immediately be applied, bringing the hoist to a stop. It is obvious that when the bank has been reached it is impossible to start the hoist in the wrong direction, as the cam interferes. The control resists any attempt to move the control lever wrongly, and mistakes such as starting in the wrong direction, starting too fast, and braking too late, are prevented.



DAILY OUTPUT:
1000 tons lifted 1600 feet (500 m) in 9 hours of actual work
Number of trips: 46 per hour
Number of Wagons: 4 per trip
Load: 2 tons 7 cwts. (2400 kg)

SPEED:
Medium: 26 ft. (8 m) per second for material
Maximum: 39½ ft. (12 m) per second for material
16½ ft. (5 m) per second for men

2 MOTORS:
Normal output: Each 240 HP.
Revolutions: 46 per minute.

PULLEY:
Diameter: 9 ft. 10 in. (3 m)

ROPE:
Size: ⊐ 0.87 in. × 3.53 in. (22 mm × 91 mm)
Diameter of wire: 0.079 in. (2 mm)
Number of wires: 163
Breaking strain: 93½ tons (95,000 kg)
Factor of safety: 9.5, with rope having a breaking strain of 114 tons per sq. in. (120 kg per sq. mm)

a. Driving pulleys
b. Guide pulley
c. Switchboard
d. Lever frame
e. Starting and regulating gear
f. Commutator
g. Oil dash-pot
h. Depth indicator with safety apparatus
i. Ammeter and voltmeter
k. Working brake (compressed air)
l. Compressed air receiver
m. Safety brake
n. Lifting arrangement for the safety brake, with emergency switch

FIG. 6. HOISTING ENGINE WITH DOUBLE PULLEYS ERECTED ON THE PIT-HEAD GEAR.

The control parts of the Siemens-Ilgner hoist are extremely simple. It has already been stated that the Ward Leonard system of control is used. All the operations of the hoist are controlled by means of one lever, which is connected with the field rheostat of the generator as well as with the brakes and safety apparatus of hoist motor. The brakes are operated by means of compressed air taken either from the large air compressors which are usually needed for the pneumatic machinery of the mine or, in case this source is not available, from a storage tank supplied from a small electrically driven air compressor. In the latter case

control lever can be moved forward just as far as the curve of the cam allows. The acceleration is therefore determined by the curve of the cam. The operator is at liberty to pull back the control lever at any time he may desire if he wants to reduce the speed or stop the hoist. It is, however, impossible for him to accelerate it to a speed higher than that determined by the shape of the cam. Before the cage has reached the bank the cam forces the control lever back, thus automatically retarding the speed of the hoist at a predetermined rate. Its shape is such that after having sufficiently reduced the speed of the hoist, toward the end of the run,

It is noteworthy that since this safety apparatus came into use the powers in authority in many mining districts in Germany have recognized the security assured by it, and the mining inspectors have given permission to raise the maximum speed allowed for the hoisting of men from 6 meter-seconds to 10 meter-seconds, where this apparatus is installed. Considerable time can therefore be saved in the carrying of men in a deep mine.

The question which naturally will be raised regarding the Siemens-Ilgner system is whether or not the running of the fly-wheel converter will cause so heavy losses that the power consumption will

be greater for this system than for others. Experience has shown that the saving in power due to the advantages of the Ward Leonard control in most cases amply compensates for the losses in the converter. When the hoist motor is controlled by means of resistances, practically all the power is consumed by the resistances when the hoist is being started, and more or less is consumed by them whenever the hoist is running at less than maximum speed. In the system described above it is possible not only to save the energy which in other systems is wasted in resistances, but also to save the power which usually is taken by the brakes. These are used merely as holding brakes, as the braking is done electrically by making the hoist motor run as a generator and return energy to the converter, where it helps to accelerate the fly-wheel, thus storing energy for the next start of the hoist.

The process of returning energy to the converter is very simple and is one of the great advantages of the system of control. The hoist motor and the converter generator are the same kind of machines, and when they are connected, the relative strength of their electromotive force determines which runs as generator and which as motor. The field of the hoist motor is constant, but the generator field is variable. When the strength of the generator field has been increased to its maximum, the motor speed being practically proportionate to the strength of the generator field, the hoist will attain its maximum speed. If the field of the generator now is weakened, its induced electromotive force will become smaller than that of the hoist motor, which, due to the momentum of the moving mass of the hoist, only slowly reduces its speed. The hoist motor, therefore, returns power to the converter and retards the motion of the hoist. All the power which during the acceleration period of the run is taken up as kinetic energy by the moving mass of the hoist can, during the period of retardation, be electrically transmitted to the converter and stored in the fly-wheel. The rate of acceleration has, therefore, no influence on the power consumption of this system. It is also evident that the amount of moving mass which for each run has to be accelerated and retarded has very little influence on the economy of the hoisting, the losses caused by it being due merely to friction and air resistance.

The great saving in power which in most cases can be effected through this system will in a short time compensate for any increase in first cost. It must be taken into consideration that when it is used the load on the power station is uniform and corresponds to the actual mean hoisting work. In other systems, with the exception of those using storage batteries, the generator plant has to take the maximum fluctuations in load and it must, therefore, be designed accordingly. The saving in power station capacity which is effected by the Ilgner system makes a reduction in the size of the generator, the engine, and the boiler possible, and this may compensate for the cost of the fly-wheel converter.

The merits of this new system for hoisting have been generally recognized in Europe. Betwen 40 and 50 large hoisting plants of the above description have been built or are under construction. Some of them have been in operation two or three years. In order to show that in both capacity and speed they compare favorably with the most modern steam plants, some data on some of the most typical ones are given in the accompanying table (p. 589).

Some of these plants have a special arrangement of their fly-wheel converters. Where several hoists are run in the same place, it is not necessary to have a special fly-wheel converter for each one. Several generators and motors can be mounted on the same shaft and have one or two common fly-wheels. In this case it is of advantage to sectionalize the shaft by means of disengaging couplings, so that only part of the plant needs to be run if only one or two hoists are to be operated. Each hoist must have a generator, and when the converters are mechanically or electrically coupled, it is not necessary to have larger fly-wheel masses for several hoists than for one. The most unfavorable condition which may be is when all hoists are started at the same time. In this case, the hoists do not attain the highest speed, as the fly-wheels more quickly discharge their kinetic energy than they would if one hoist were started at a time. The fly-wheels have ample time to build up their speed

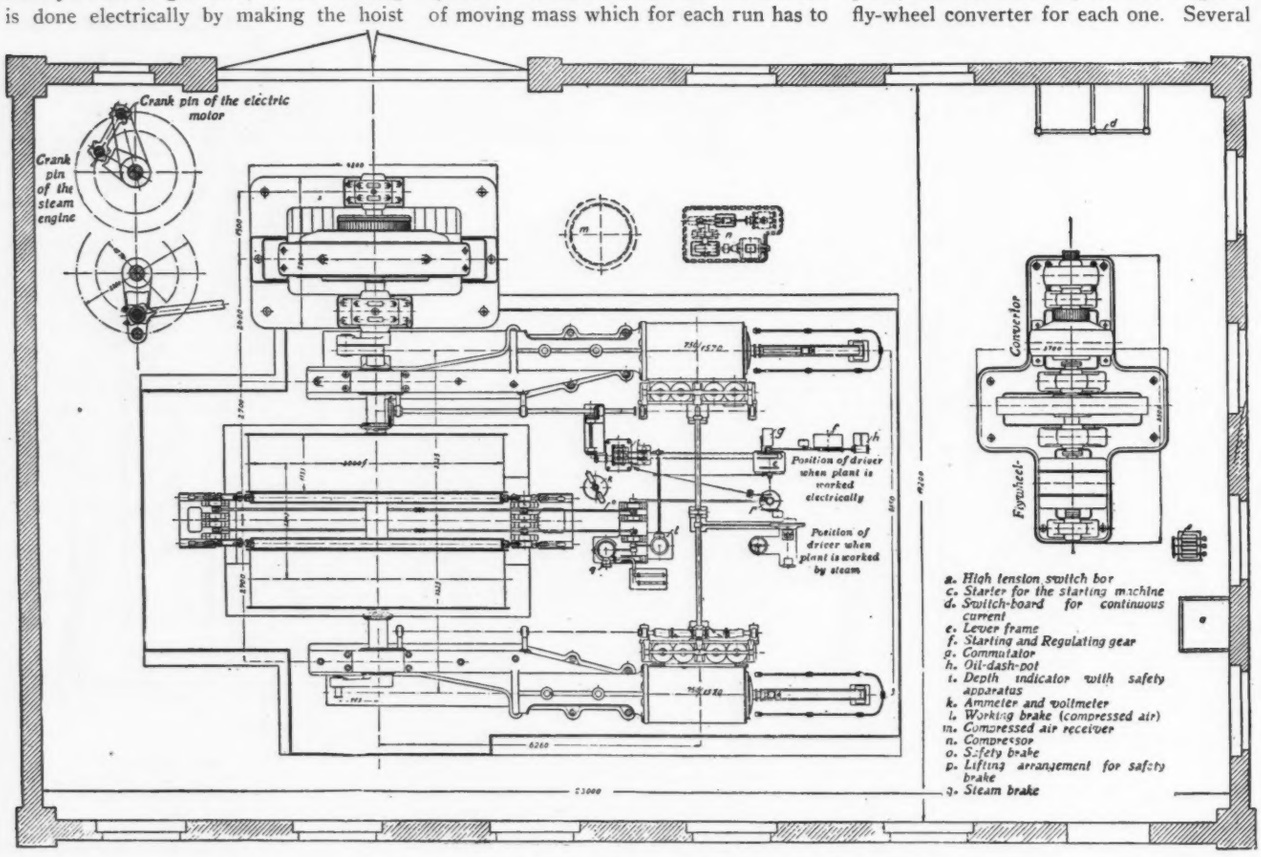

Crank pin of the electric motor
Crank pin of the steam engine
Converter
Flywheel
Position of driver when plant is worked electrically
Position of driver when plant is worked by steam
a. High tension switch bor
c. Starter for the starting machine
d. Switch-board for continuous current
e. Lever frame
f. Starting and Regulating gear
g. Commutator
h. Oil-dash-pot
i. Depth indicator with safety apparatus
k. Ammeter and voltmeter
l. Working brake (compressed air)
m. Compressed air receiver
n. Compressor
o. Safety brake
p. Lifting arrangement for safety brake
q. Steam brake

FIG. 7. STEAM HOIST ADAPTED FOR ELECTRIC DRIVING.

again, as the period for retardation is lengthened. When the hoists are working under the most favorable conditions, that is, when they are started one at a time at regular intervals, the amount of fly-wheel momentum required by several hoists whose converters are mechanically or electrically coupled is less than that required by a single one. If two or more converters are not mounted on the same shaft, they can easily be electrically coupled. The generators are then built for half the voltage of the hoist motor. If the generator of one converter is connected in series with a generator of the other, the two together will give the full voltage to the hoist motor, and the fly-wheels of the two converters will work in conjunction just as if they were mechanically coupled.

In places where during the night hoisting is done only occasionally, it would cause a great loss of power to keep the fly-wheel converter running all night. It would also take too much power to start the fly-wheel and accelerate it for each trip. To avoid these losses, it is advisable to have a converter to which the fly-wheel is connected by disengaging couplings. A good arrangement is to have a motor-generator set on either side of the fly-wheel, which is connected with them by means of disengaging couplings. With this arrangement it is possible to use the converter in a way which makes it efficient under varying conditions. During busy hours, the whole plant is run. When less work is being done, one converter may be at rest while the other is working in conjunction with the fly-wheel. When hoisting is done only occasionally, one converter can be run without the fly-wheel, in which case the hoist is run only at half-speed.

The flexibility of the Siemens-Ilgner system has made it applicable in almost all cases where hoisting on a large scale is done. The reliability of the control, the economy in power consumption, and the uniformity of the load on the power station make this system superior to any other. The best evidence of its merit is the wide application it has gained in a very short time. Most of the new mining hoists in Europe have been built on this system and some of them have stood two or three years' test. There is no doubt that when this type of hoist has been introduced in this country it will gain a wide application in the mining districts, where it will fill a long felt need.

DATA OF SIEMENS-ILGNER INSTALLATIONS IN EUROPE.

No.	Company.	Tons in Eight Hours.	Depth Yards.	No. of Trucks per Cage.	Effective Load, Lb.	Maximum Speed, Ft. per Minute.	Mechanical Arrangement.	Drive.	Power and Distance from Supply.
1	Gelsenkirchener Bergwerks-A.-G., Rheinelbe, Westphalia, Germany.	1,350—2,000	Now 300 Later 550	6	9,400	Now 1,980 Later 3,900	Koepe pulley, 19 ft. 8.4 in. dia. Rope dia. 1.77 in.	2 direct coupled motors.	Steam engine, continuous current, 500 volts, 0.06 mile.
2	Königl. Württembergische Saline Friedrichshall, Kochendorf, Germany.	600	205	2	3,140	1,380	Cylindrical drums, 10 ft. dia. Rope dia. 1.18 in.	1 direct coupled motor.	Steam and water turbine, 3-phase current, 2,000 volts, 0.95 mile.
3	Steinkohlenwerk Vereinigte Glückhilf-Friedenshoffnung, Hermsdorf, Silesia, Germany.	400	Now 216 Later 383	2	3,360	960	Cylindrical drums, 13 ft. dia. Rope dia. 1.38 in.	Geared motor.	Steam engine, 3-phase current, 2,000 volts, 0.75 mile.
4	Zeche Mathias Stinnes Carnap, near Essen a./Ruhr, Germany.	800	Now 550 Later 866	8	10,750	2,760	Koepe pulley, 21 ft. dia. Rope dia. 2.32 in.	2 direct coupled motors.	Steam engine, 3-phase current, 5,000 volts, 5.6 miles.
5	Zeche Mathias Stinnes Carnap, near Essen a./Ruhr, Germany.	800	Now 550 Later 866	8	10,750	2,760	Koepe pulley, 21 ft. dia. Rope dia. 2.32 in.	2 direct coupled motors.	
6	Zeche de Wendel, Pelkum, near Hamm, Westphalia, Germany.	1,400	Now 820 Later 983	8	11,650	3,540	Koepe pulley, 21 ft. dia. Rope dia. 2.36 in.	2 direct coupled motors.	Steam engine, 3-phase current, 3,000 volts, 0.06 mile.
7	Gräflich Larisch Mönnichsche Berg-Direktion, Karwin, Silesia, Austria.	1,000	580	4	6,720	2,340	Cylindrical drums, 15 ft. 6 in. dia. Rope dia. 1.46 in.	1 direct coupled motor.	Steam and gas engine, 3-phase current, 3,000 volts, 1.1 miles.
8	The Priestman Collieries Ltd., Newcastle-on-Tyne, England.	820	84	..	3,500	480	Cylindrical drum, 5 ft. 7 in. dia. Rope dia. 0.95 in.	1 motor with double reduction gear.	Steam engine, 3-phase current, 5,500 volts, 5 miles.
9	Bergverwaltung Georg v. Giesche's Erben, Schoppinitz, Upper Silesia, Germany.	1,580	440	8	9,730	2,960	Koepe pulley, 19 ft. 8.4 in. dia. Rope dia. 2.12 in.	2 direct coupled motors.	Steam engine and turbine, 3-phase current, 2,000 volts, 0.84 mile.
10	Bergverwaltung Georg v. Geische's Erben, Schoppinitz, Upper Silesia, Germany.	790	440	4	4,865	2,960	Koepe pulley, 19 ft. 8.4 in. dia. Rope dia. 1.57 in.	1 direct coupled motor.	
11	Fried. Krupp A.-G., Essen a./Ruhr, Germany.	1,230	Now 725 Later 985	8	13,250	3,940	Koepe pulley, 21 ft. dia. Rope dia. 2.36 in.	2 direct coupled motors.	Steam turbine, 3-phase current, 3,000 volts, 0.03 mile.
12	Steinkohlenbergwerk Rheinpreussen, Homberg a./Rhein, Germany.	1,300	Now 330 Later 660	6	7,300	Now 1,770 Later 3,540	Koepe pulley, 19 ft. 8.4 in. dia. Rope dia. 1.8 in.	2 direct coupled motors.	Steam engine, 3-phase current, 5,000 volts, 0.31 mile.
13	The Duffryn Rhondda Colliery Co. Ltd., Port Talbot, South Wales, England.	1,500	Now 520 Later 667	2	8,960	3,000	Koepe pulley, 18 ft. dia. Rope dia. 1.83 in.	1 direct coupled motor.	Steam engine, 3-phase current, 2,200 volts, 0.02 mile.

Production of Tin in the Straits Settlements.

According to Consul-General David F. Wilber, of Singapore, the reports for this year made by the commissioner of mines of the Federated Malay States show a decline in the output of tin compared with last year, while the total exports show an increase for the six months of this year over those of last year. For the first six months of the years 1905 and 1906, the shipments of tin from Singapore and Penang were as follows, in tons of 2240 pounds:

Countries to which shipped.	1905.	1906.
United States	10,616	8,040
England	17,080	20,573
Continent of Europe	4,595	4,219
Total all countries	32,291	32,832

This is a very small increase to be shown by the world's largest tin producer.

The Savage River Pumping Plant.

BY L. B. ABBOTT.*

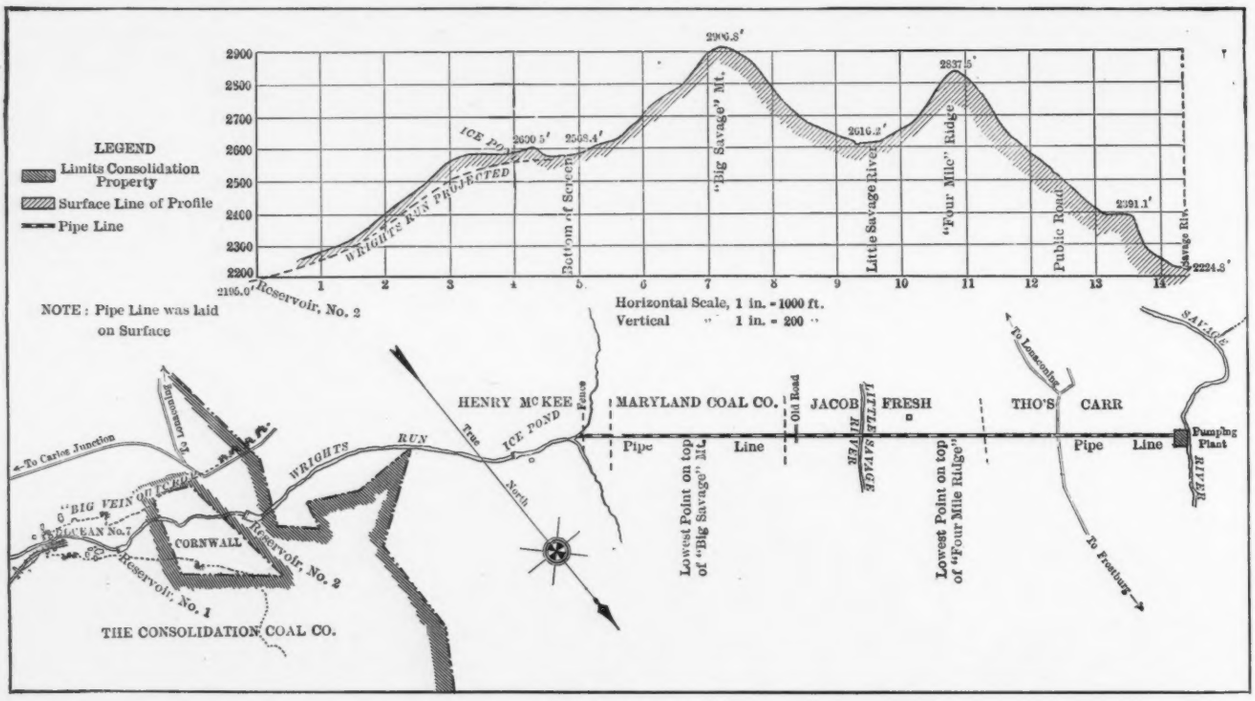
The question of sufficient water for mining plants becomes a serious one in the Georges creek coal region during the summer and early fall months. The principal water course in this region is Georges creek, which is fed by many small streams. Pollution by mine drainage has made the water of that creek unfit for use, and as most of the small streams run dry during the summer months, this source of supply is uncertain, and there must be some means of obtaining a constant supply during the dry season.

The failure of the streams to furnish water throughout the year is especially pronounced at Ocean No. 7 mine of the Consolidation Coal Company. This mine is situated near the head of Wright's Run on a branch of the Cumberland & Pennsylvania railroad, about six miles south of Frostburg, Md., and a mile west of the center of the Georges creek coal basin. The daily output from this mine is over 3500 tons, and it is expected to increase this in the near future. At the present time there is 750 h.p. of boiler capacity, but additional boilers now being installed will bring it up to 1200 horse-power.

The water supply is obtained from Wright's Run, there being two storage reservoirs on this stream of 1,000,000 and 3,000,000 gal. capacity respectively. Besides furnishing water for boilers, the mining villages of Lord and Woodland, and the Cumberland & Pennsylvania railroad must be supplied, the water necessary for present needs being about 230,000 gal. per day. More water will be needed in the future to meet the demands of increased boiler power, and a growing population.

Wright's Run furnishes an abundance of good water for nine months in the year, but during the last two or three summers has failed, and it has been necessary to obtain water from some other source. During the first one or two years of water famine at Ocean No. 7 mine, water was hauled 8 or 10 miles over the Cumberland & Pennsylvania railroad in large tanks, a very costly operation. Two other methods presented themselves: an artesian well and pumping station at Carlos Junction, in the center of the coal basin, about one mile east; or a pumping station on Savage river, nearly three miles northwest, the only available stream. Estimates of the cost of the two methods were considerably in favor of the pumping station on the Savage river, with maintenance in favor of the artesian well and pumping station at Carlos Junction. However, on a basis of two months' pumping, the cost of operating the two plants was about equal. For a greater length of time, the cost of pumping was in favor of the artesian well. A sure and permanent water supply being certain, and the time to install and get the plant running being limited, it was decided to put the pumping plant on Savage river.

The location of the pumping plant with reference to Ocean No. 7 mine is shown in the sketch. Two mountain ranges ran nearly at right angles with the proposed pipe line, as shown on the profile, viz., Savage mountain, with an elevation of 2907 ft., and "Four Mile" ridge, with an elevation of 2838 ft. The pipe line ran from Savage river over "Four Mile" ridge, across the valley of Little Savage river, and over the Savage mountain, the total vertical lift being nearly 700 ft. It was decided to run the pipe line from the river to a short distance over Savage mountain. From this point, the water was to be carried by a square wooden trough a distance of some 2100 ft., emptying into the creek bed and flowing down this to the storage reservoirs near the plant. To supply sufficient water for daily use, a pump of 500 gal. per minute capacity was necessary, and the supply steam, two 100-h.p. boilers. The water was to be carried 4000 ft. through a 6-in. pipe, the size then being increased to 8 in for 4000 ft., both sizes being of double-strength wrought iron.



PROFILE AND PLAN.

After the location of the pumping station had been decided upon, orders were given to install the pumping plant and get it running within 30 days. Up to this time, only preliminary surveys to obtain data for estimates had been run, no rights of way secured, and the orders for pipe, pumps and boilers had not yet been made. Orders for material were at once placed, and by good fortune immediate shipment was secured. In the meanwhile, a final survey was started to stake out the line, and locate the various properties. It was desired to cross both mountains at their lowest point, obtain a favorable and accessible site for the pumping plant on the

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river, and have the pipe line straight throughout its length.

The Savage river flows through a very narrow valley, and as favorable locations were few, it was thought there would be trouble in getting the alinement necessary. On the top of Savage mountain a place was cleared of timber, and with a level the lowest point near the desired line was found on "Four Mile" ridge. In the same manner the lowest point on Savage mountain was found by observations from "Four Mile" ridge. These two points established, the line was extended to the river, hitting the river at one of the few desirable points. From Savage mountain, the line was extended back to intersect the head waters of Wright's Run. This line came out in a swamp, and it was found necessary to shift the point on Savage mountain some 150 ft. to the north. The line was then re-run, and the different properties crossed by the proposed pipe line and the roads over which rights of way had to be obtained were located. The rights of way were secured a few days after the completion of the survey and consisted of a strip of one rod in width, and the use of several roads. An acre of ground on the river was also purchased for the pumping station.

FIG. 1.

All the material was hauled from Frostburg, a distance of eight miles, over roads that had to be practically rebuilt in many places, while from the main road to the pumping station, a distance of three-fourths of a mile, a new road had to be cut and graded, and put in good shape for the heavy loads to be hauled over it. The mountain at this point was very steep, as will be seen by reference to the profile, and much difficulty was experienced in cutting a road for the heavy teams.

It took five days to haul the 8000 ft. of pipe to the two distributing points, one in the valley of Little Savage river, and one near the pumping station. From 12 to 15 teams were used, each team making one trip a day. A two-horse team hauled five lengths of pipe, or about 96 ft., while a four-horse team hauled nine lengths, or about 170 ft., nine lengths being all that could be loaded on a wagon. The cost of hauling the pipe from Frostburg to the two distributing points, a distance of eight miles, was 4.7c. per ft. From the distributing points a team dragged each length of pipe to its place in the line, the average cost of distributing being nearly 1c. per foot.

Immediately after the survey, a large force of men started to clear the right of way, which was in readiness when the pipe arrived, and while the pipe was being distributed, a force of 12 men started to join it up. Owing to the rocky nature of the ground, it was found impossible to bury the pipe and get it in readiness in the time desired, so it was blocked up about a foot from the ground. The force of 12 men were paid as follows: One man at $2.25 per day; three men at $2.20 per day; and eight men at $1.75 per day. The entire 8000 ft. was laid in 10 days, or an average of 800 ft. per day. The biggest day's work was to put together 60 lengths, or nearly 1200 ft. In many places the ground was very rough, and cribs 6 and 7 ft. high had to be built to hold the pipe. The average cost per foot to lay and block pipe above the ground was 2.9c. This included putting in stay rods every three or four hundred feet, to keep the pipe from jumping when the pump was running, and drain cocks at all low places.

The two boilers used are the Erie City economic boilers, of 100 h.p. each. Great difficulty was experienced in hauling these boilers, it taking nearly three days to transport the first boiler from Frostburg to the pumping station. This was due to the bad condition of the roads. The second boiler was hauled in a day and a half.

The pump is a Snow steam pump, compound duplex, outside end packed, 18x28 in. by 8x24 in., with a capacity of 500 gal. per minute. The suction pipe is of 8 in. diameter; discharge, 6 in. The cost of hauling the two boilers and pump, and unloading at Frostburg and the pumping station and setting up was about $550.

Fig. 1 shows the boilers and pump in place, and Fig. 2, the pipe line crossing the valley of Little Savage river. A frame house has since been built over the boilers and pump, thus giving storage for about 100 tons of coal. The pump is about 40 ft. from the river, and the house built on a high masonry wall to prevent damage in case of floods.

The pumping plant is chiefly remarkable for the short time taken to install it, it being put in commission just 33 days after orders had been given to go ahead. During this time the pipe, pump and boilers had been ordered, hauled over eight miles of rough road, the boilers and pump set up and the pipe laid. Surveys were also made, rights of way secured, and line cleared. The plant was put in commission Oct. 3, 1905, and proved successful in every way.

FIG. 2.

The pipe line will be painted with two coats of red-lead paint this fall, the fol-

lowing proportions of lead and oil to be used: Red-lead paint, 20 lb. red lead at 7¼c., $1.45; ¾ gal. raw linseed oil at 40c., 30c.; 1 gal. red-lead paint, $1.75. One gallon will cover about 700 sq.ft. for the first coat, and 1000 sq.ft. for the second coat. For the 8000 ft. of pipe, it will take 36 gal., the total cost of which, at $1.75 per gal., is $63. It is expected that one man will clean and paint 500 sq.ft. per day, making the total cost of labor for painting two coats, at $2 per day, $120. Haulage and brushes will add about $20 to the cost. The entire cost will be about as follows: 36 gal. of paint, at $1.75, $63; labor, painting and cleaning pipe, $120; hauling, brushes, etc., $20; total, $203.

Copper on Vancouver Island.

SPECIAL CORRESPONDENCE.

Herbert Carmichael, assistant provincial mineralogist, returned recently from an official visit to the Big Interior group. This property has heretofore been reported as situated in a locality most difficult of access, but Mr. Carmichael states that no serious engineering difficulties will be found to exist whenever the construction of a railway to the neighborhood of the property shall be undertaken. The route by which the property is at present reached is from Alberni by wagon road to Great Central lake, thence by boat up the lake, which is about 25 miles long and runs east and west, and then by trail 10 miles to the group of seven mineral claims comprising the property. The showing of mineralized rock is described as being a very remarkable one, the entire face of precipitous cliffs, extending a distance of some 4000 ft. horizontally, and 1000 to 1300 ft. high, being a zone of quartz-porphyry mineralized with copper pyrites, pyrrhotite and pyrite. Above these cliffs, and a short distance back from the top of them, the mountains rise higher, with mineral continuing to show in the rock for fully 700 ft. farther up. In places the ore appears to be of good grade, but the great bulk of it seems low-grade.

The only development work done is a short prospect tunnel 31 ft. long. The surface showings are of such a nature that the few hundred feet of underground work, within the means of the locators of the claims, would be of little use toward proving the value of the property. It is understood that H. C. Bellinger, manager of the Britannia Smelting Company's smelter on Vancouver island, has sent in men to sample the ore, of which there are thousands of tons lying at the base of the cliffs, broken down during a long period of exposure to the elements. Mr. Carmichael's opinion is that if railway transportation be provided it will come from the direction of Comox, where there are coal mines and coke ovens in operation, via Ash lake, and up a valley affording a generally easy grade to the Big Interior property. This would allow of coke being taken in to the mine, were a smelter erected at it, or of the higher-grade crude ore and concentrates—for he regards the ore as suitable for water concentration—being shipped to an outside smelter. A large expenditure of money will be required to determine the ore extent and the best means of treating it. Although the elevation is high for a Vancouver island property—about 5700 ft. above sea-level to the highest point where ore is known to occur—the snow does not lie very deep in winter, so that work could be continued throughout the year. It is probable that the action of the Provincial Government, in having one of its fully qualified officials examine the property and prepare a disinterested report on it, will result in hastening the making of an arrangement with capitalists for the extensive development of this mineral deposit.

Lead-Wool.

Lead-wool is a new substitute for molten lead in calking ordinary hub and spigot pipe joints. It is shredded to about the size of heavy thread, collected into bundles of convenient length and of a size in proportion to the joint to be filled, twisted somewhat, and calked cold into the joint against a back of hemp or tarred yarn, as usual. It is claimed that lead contracts on cooling from its molten condition when poured into the joint, and leaves a space between itself and the pipe; also that calking only spreads the outer portion of this lead, leaving the inner part free to leak.

It is also claimed that the yarn in the joint is not compressed sufficiently in the melted lead joint, but that in the lead-wool joint the strands of lead are packed as they are put in, thus keeping the yarn under compression and filling the joint perfectly full of lead for its entire depth. A strand of lead-wool is inserted in precisely the same way that the yarn had been put in and calked with the three calking tools in order. These tools do not have square ends, but are dull pointed, having V-shaped ends which tend to spread the lead against the pipe. Then another layer is inserted, calked, and so on, until the joint is filled. The calking solidifies the lead and yet leaves it free to adjust itself, so that when the joint is deflected the lead and yarn adjust themselves and still fill the space. In calking, the lead should be forced from the spigot toward the hub by the tool rather than spreading equally.

With lead-wool there is more yarn and less lead used than with a poured joint. About 75 per cent. as much lead is ordinarily used per joint, but skillful calkers require less. About half the depth of lead is necessary, but careful calking is essential. According to some tests made at the Mannesman Tube Works the joints withstood enormous internal hydrostatic pressure, the 3-in. pipe joint just beginning to give way at 3450 lb. per sq.in.

This material is manufactured in Germany and Great Britain.

Gold Milling at Hillsboro, N. M.

In the new mill which is being built for the Sierra Consolidated Gold Mining Company at Hillsboro, N. M., by the Traylor Engineering Company, of New York, the stamps will be driven electrically in units of 10, each unit having its individual motor. The mortars will be of the Homestake pattern. They are built with extra heavy bases and will be set on concrete foundations. The mortars will have steel liners on the ends and sides and under the dies. The feed spout will also have a steel liner.

Amalgamation will be accomplished with chuck block coppers in the stamp batteries and on 16-ft. table plates in front of the mortars. The pulp goes from the table plates to an elevator which carries it to special hydraulic classifiers. From the classifiers it goes to the concentrating tables. The latter will also be operated electrically, and in order to insure constancy of action will be driven by a separate motor.

Present Lake Gold Discovery.

SPECIAL CORRESPONDENCE.

Gold-bearing quartz has been discovered at Larder or Present lake, in the unsurveyed territory about 45 miles north of the cobalt area of Ontario, and above the Hight of Land. A large number of prospectors have been at work in the neighborhood. The discovery, which was made some time since, was kept quiet as long as possible, but toward the latter part of August the news got out. A rush to the new field took place, and before long the gold-bearing section along the lake-shore and for three miles back was all staked out. Several of those securing claims will undertake development work at once. The country is very rough and communication difficult. It is reached by canoe and a portage of six miles from Tomstown to the head of Wendigo lake, thence by a chain of small lakes running north to Raven lake, thence westerly again a short distance to Present lake.

A record in unloading iron ore was made on Sept. 2, at Conneaut, Ohio, when 9574 tons of iron ore were taken out of the steamer "William E. Corey," 7506 tons being put directly on railroad cars, and 2068 tons in the storing bins at the dock. The actual unloading time was 3 hours, 32 minutes; the steamship was at the dock 4 hours, 29 minutes. The work was done by two electric-driven unloaders, one of the Hulett and one of the Brown type.

Colliery Notes.

In a mine car, the larger the ratio of wheel diameter to axle diameter, the less is the coefficient of friction.

Experienced operators now strongly advocate the longwall system as a method for working all inclined seams where the pitch exceeds 30 degrees.

In determining the theoretical diameter of the port of entry of a fan after it has been decided how many cubic feet of air will pass per minute, the general custom derived from practice is to assume the velocity of the air as 1200 ft. per minute.

Explosives should contain only a very small percentage of nitrate of potash, as it makes them too sensitive to shocks and consequently very dangerous. If nitrate of sodium is present, the explosive is deliquescent and absorbs too much moisture from the air.

In longwall work it is better to turn off the cross-entries so they will make an angle of about 45 deg. with the main entries. This method of driving the cross-entries diagonally, permits the development work to advance better in a circle, and affords a more direct haulage road from all parts of the working face.

In mining flat or slightly-inclined seams by the longwall system, it is cheaper and more advantageous to advance the road heads even with the wall, rather than to allow them to work on ahead. When roadways and wall advance together, the roof pressure is better controlled, and there is less liability to squeeze.

In preparing coal for use in a boiler it has been proved by experiment that the quantity of extremely fine dust through a 100-mesh screen is almost three times as much in unwashed as with the washed coal. This fact is of much importance, as the presence of fine dust has a great influence on the burning of the fuel.

Several experiments carried on with a view to testing explosives have proved that when stemming was tightly rammed with the aid of a hammer, no ignition occurred; when the shots were hand-stemmed, several of them fired the inflammable atmosphere. The most interesting fact discovered showed that electrical hang-fires, involving an interval of 50 sec. between explosion of detonator and explosion of the charge, are possible.

In surveying diamond-drill holes by means of hydrofluoric acid etching a glass tube, it must be remembered that the metal case inclosing the glass tube is liable to become magnetized if made of iron, and cannot then be successfully lowered. If the cartridge is made of brass, this difficulty is overcome. The glass tube used should be 1 in. in diameter, and 6 in. long, the ends closed by rubber stoppers. The acid should be diluted to a strength of about 30 per cent. One hour and a half is sufficient time to give a good etching.

The practice of splitting the air-current in a mine is becoming more generally adopted. In West Virginia several new mines are opened up by driving six parallel entries. The two middle entries are the intake while the two entries on the left and the two entries on the right each act as separate returns for the air on that side of the mine. In this system the right side of the mine is entirely separate from the left side; overcasts are used, and any accident on one side of the mine does not affect the workings on the other side.

The experience of a miner who was recently overcome by after-damp is interesting. When the gas first came on him, he became quite sick and his limbs felt heavy and refused to act properly, causing him to stagger. In a few minutes he became insensible. Nothing more was known until he had been rescued and taken to his home. This disproves all theories which hold that a person overcome by after-damp suffers in agony. The faces of such victims appear as though sleeping, without any appearance of suffering.

Every coal company should have the weighman, or some employee, tack placards on each car of the coal shipped. The cards should tell the general name of the coal and the name of the company. Several companies are using this system to good advantage, and so far as advertising is concerned, it is doubtful if a cheaper and more effective way can be found. Where the mines are located along a main-line railroad, it is also advisable to have the name of the mine and operating company painted on the tipple, or in some conspicuous place.

In entering a mine after an explosion, the greatest danger is from being overcome by the afterdamp. This gas is more dangerous, because it permits the lights to burn more brightly when it is present. A practical miner has suggested that after the investigator has supplied himself with a good safety lamp, he should also take with him underground a caged mouse; this little animal will show signs of prostration from the effects of the gas in about one-twentieth of the time necessary to overcome a man, and thus give ample warning when a retreat should be made into fresh air.

Scientists who have investigated the subject tell us that a lamp or naked light in a mine requires 100 cu.ft. of air a minute. In like manner we are informed that a man requires 100 cu.ft. per minute and a mule or horse needs 1000 cu.ft. per minute. Why is it then, that the mine laws of Ohio, West Virginia and other States only require that 100 cu.ft. per min. be furnished each man? This quantity of air does not allow a sufficient surplus in the supply properly to remove gases and insure safety in case of a fire or other mishap. A supply of 500 cu.ft. per min. is not excessive in any coal mine.

Where rooms and entries are driven oblique and not at right angles to each other, the pillars remaining are also oblique in form and are sharply pointed at some of the corners. The great disadvantage attending such an operation is experienced when robbing is started. The pillars having these sharp corners are not properly shaped to withstand the heavy roof pressure when robbing is going on. The coal in the points of these pillars is therefore often lost. The general policy is now to work everything square, which permits the pillars to be more easily robbed on retreating work, and less coal to be lost.

In the installation of electric cables, where conditions permit their being buried underground, the general plan of using iron troughing has presented many difficulties due to the faulting of the trough, which causes short-circuits. In order to eliminate this defect, a system has been introduced wherein asphalt is the principal material employed. A continuous trough made of welded joints is produced. The cables are laid on the bottom of the trough and after pouring in hot bitumen, then hot asphaltic concrete is poured over them, welding the whole into a solid mass. Asphalt is an excellent electrical insulator, is easily repaired and permits any necessary bend being made.

In determining the horse-power of an engine, perhaps the best method is first to ascertain the diameter of the piston in inches; then the length of stroke in inches; after this the number of revolutions per minute, and the mean effective pressure should be found. Now from the piston diameter we determine the piston area. Next we take the number of engine revolutions per minute and multiply this by the length of the stroke; and after multiplying the product by 2, we divide the result by 12, which gives the piston speed in feet per minute. Taking these results we find that the indicated horse-power is equal to the piston area, multiplied by the mean effective pressure, multiplied by the piston speed, divided by 33,000.

It has been the general custom in determining the quantity of air needed in a mine, to measure the volume passing down the intake or exhausting from the fan. Mine laws are based on such determinations. Would it not be well to spend equal time and attention in determining the quality of air coming from a mine? If one mine makes a large quantity of gas, and another mine, equally large and employing the same number of men, makes no gas, is it well then, simply to conform with the present inadequate mine laws and regulate the quantity of air sent in according to the number of men employed? The quality of the air finally coming from the mine would form a more sensible basis from which to determine the quantity of air needed.

Metallics.

When the shells of the crushing rollers of Huntington mills wear unevenly, they produce intense vibration. Consequently every effort should be made to maintain an even circular face.

At a recent meeting of the Redrutn Board of Guardians in Cornwall, it was stated that 20 per cent. of the widows and children dependent upon the union were attributable to the death of the husband from phthisis, most of the men having once been at work in the mines of South Africa.

When a cold massive piece of steel, as an ingot, is to be heated in a furnace, it is a matter of importance to know whether its previous cooling was rapid or slow. If rapid, it may contain so much strain as to be ruptured internally by the heating operation, while if it has been slowly cooled it may, because of smaller internal strains, endure that operation safely. To reduce strains in ingots which are to be cooled to the atmospheric temperature, the rate of cooling should be retarded.

In the specifications for wire for a great suspension bridge, the wire as drawn must have a tensile strength of 215,000 lb. per square inch, and after galvanizing must have a tensile strength of 200,000 lb. per square inch. This decrease of 15,000 lb. per square inch is the loss of strength due to removal of strains by heating the wire for a brief period to the galvanizing temperature, or, say, to 800 deg. F. If the heating even at that temperature were long continued, a much larger loss of tensile strength would no doubt result.

In putting new die rings into a Huntington mill, they should be set perfectly level. The wedges should be of the same size and shape. In some practice wedges 1¾ in. broad and 6 in. long have been found to be the best; the width depends, of course, upon the space they have to pack. They should fit so tightly as to fill up all the interstices, but should not require so much force as to blume the edges badly. A good deal depends upon the shape of the wedges, the variety of wood used, and the care with which they are put in.

According to G. Gin, in *L'Electricien*, Aug. 18, 1906, metallic molybdenum can be produced by electrolyzing a double chloride of molybdenum and sodium, fused, using an anode of carburized molybednum and a cathode of molten lead, contained in a basin of pure molybdenum sulphide compressed with coal tar. The molybenum deposited from the electrolyte is dissolved in the lead, which can be run as long as the alloy does not contain more than 18 per cent. Mo. The two metals are separated by distilling off the lead in an electric furnace. The production of 1 kg. of pure molybdenum requires about 11 kw. hours for the electrolytic operation.

In certain mines on the Witwatersrand, when there are a large number of holes to fire, for example 30, the procedure is as follows: A 6-ft. length of fuse is taken and is notched at spaces 0.5 in. apart for a length of 4 ft. This is then lit at the end, and as the fire travels up the fuse, it spits out at the notches, and one holds the notch at the end of the fuse connected with the charge to be fired. Since fuse burns at an equal rate, unless defective, this method acts as a gage, inasmuch as when the last notch has spit out, it is known that only 2 ft. remain to be burned in the first hole fired.

That the central part of the earth is hot is beyond question. Assuming that the increment of temperature that has been observed in deep shafts and bore holes is maintained, it has been estimated that, at very moderate depth, the melting temperature of the most refractory substance would be reached. Thus at 50 miles below surface, the temperature is about 4600 deg. F., or 1520 deg. above the melting point of platinum. In spite of this temperature, it is inconceivable that the interior of the earth should be liquid, on account of the tremendous pressures existing there, which would preclude the expansion necessary for liquefaction.

The shape of the piece of metal affects strains very greatly when it is heated or cooled. If it be made up of relatively thick and thin parts continuously connected to each other, such as the thin web and thick hub and rim of a car wheel, on changing its temperature strains will be set up within it not only between the interior and surface portions but between the thick and thin parts as a whole. In the case of a cast car wheel these latter strains are those which are dangerous, causing the breakage and consequent destruction of the usefulness of the wheel if they be allowed to develop to their fullest extent by allowing the wheel to follow its own rate of cooling in the open.

When dangerous strains are liable to arise from too rapid cooling, they may sometimes, as in the case of a cast-iron car wheel, be relieved or reduced in intensity by a slower rate of cooling, the red-hot wheels being piled up in tight soaking pits built in the ground, and allowed to cool very slowly. The lowering of the temperature of both the thick and thin parts is maintained at a rate sufficiently uniform to ensure their reaching ordinary atmospheric temperatures at about the same time; the thicker parts do not then continue their contraction after the thinner have ceased theirs, which action, if it took place, would result in strain that might easily be dangerous to the integrity of the wheel, in view of the almost total lack of ductility in the cast iron of which it is made.

In the mines of the Witwatersrand, up to the present time, the most satisfactory device introduced for the transport of ore in the stopes is the plain shaking chute for angles of 15 deg. and over. The simplest and best form is made of ⅛x 24-in. steel, rolled to form a trough 6 in. deep and 12 in. wide. Holes of 1½ in. diameter are punched in the corners, and connections of sections are quickly made by passing the hooks of the bridle chains through each pair of holes. For stopes of 4 ft. in width and over, at 15 deg., these chutes work fairly; at 25 deg. they work well; and at 30 deg. and upward, they work excellently. Obviously, as the angle decreases, the labor of shaking increases. With a good equipment of these chutes, and with careful supervision, the economy of labor is very large, as compared with shoveling in stopes. In stopes below 4 ft. in width the chutes do not give such results.

In developing faces, the air is usually close, although when machines are running, it should not be bad. However, the machine is seldom running more than 70 per cent. of the time, and often not more than 40 per cent. It is the drilling of dry holes in such places that is so dangerous, and in the opinion of some engineers is the chief cause of phthisis in the mines of the Witwatersrand. In the opinion of one engineer, the best solution of the trouble is a water service laid to each face, through 1-in. or 1½-in. pipe. A pressure of 100 to 150 lb. is obtained from a tank placed at a convenient hight above the working places, or by connection with the water column in the shaft. The pipes terminate in a length of hose with a ⅛-in. jet. By this means a fine but strong stream of water may be forced to the back of a 6-ft. hole, and besides making the conditions more sanitary for the workmen, is found also to increase materially the speed of drilling.

In opening a mine on a regular vein of ore, lying at a moderate slope, the farther apart the levels are run the less will be the cost of development work per ton of ore stoped. However, it is bad policy to run the levels too far apart, for several reasons, one being the failure to disclose necessary information as to the character of the ground, and another the fact that while the cost of development work per ton of ore may be reduced, on the other hand the cost of handling the ore may be increased. In South Africa, where the banket vein is of extraordinary regularity in character, it has been suggested by some engineers to increase the backs up to 600 ft. In the opinion of other engineers, however, this suggestion is neither sound nor likely to prove economical. Taking, for example, a 5-ft. vein, with 300-ft. backs, the development costs about 25c. per ton. By increasing the back to 600 ft., this is reduced to about 12½c. per ton; but the saving is soon eaten up by the cost of shoveling from the upper 300 ft of the stopes.

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*Illustrated.

Lake Superior Iron-Ore Prices.

The question of iron-ore prices for the coming year is a vital one for furnacemen and ore miners. That they will be at least 50c. a ton higher, for bessemers, than the price on which 1905 sales were originally made, is unquestioned, but how much higher than that they may reach can only be conjectured. The 50c. advance on the bessemers and 25c. on non-bessemers will put ores as follows: Old Range bessemer $4.75; Mesabi bessemers $4.50; Old Range non-bessemers $4; Mesabi $3.75. But Mesabi standard bessemers have recently been selling at better than 50c. advance. The Stevenson has sold a block of its ore for this fall's delivery within the past three weeks at $4.60, which is 60c. above last season. It is interesting to note that this is $1.85 above the price which the Stevenson company accepted a few years ago for long-term contracts on a large block, under which contracts it is still shipping a great portion of its product. The mine will ship this year fully 1,000,000 tons, and perhaps, with the increased car service on the Great Northern road now in evidence, may possibly pass that. Its shipments to date have been about 730,000 tons. Hawkins has sold, for Lake Superior consumption, at $4.25, which is equal to fully $4.50 for standard; the Tesora company and the Mayas companies have sold at 50c. ahead of 1905 prices, and many other companies among the smaller independents have done likewise. This is true, not alone of the Mesabi, but to a lesser extent of other and older ranges. With standard ores at $4.75 and $4.50, prices will be higher than in any year since 1900, when Old Range sold at $5.50 and Mesabi at $4.50. It is to be noticed, and is important, that then Mesabis were discriminated against to the amount of $1 per ton, while now the differential is only 25c. Since 1900 the lowest prices were in 1904, when Old Range bessemers brought $3.25, base, and Mesabis $3. Mesabi non-bessemers that year sold for $2.50. There was not much profit in owning an iron mine so recently as 1904, and independent steel makers were lulled into a sense of security from which they have had a sharp awakening.

Ore consumers and steel makers without ore reserves should take note of the fact that statements of the discoveries of mines and the opening of new properties are somewhat misleading. They do not mean, and should not be taken to indicate, that new discoveries are made as frequently as would appear. For this is not the fact. The change that has taken place in a short period in the conditions surrounding iron-ore mining have been so great, and the betterment in price of ores has been so marked, that what three years ago was a valueless deposit is now a mine promising considerable profit. Small high-grade orebodies, too small a few years ago to be considered by operators, all of whom were looking for large and easily mined ore deposits, are now sought after. Deposits that four or five years ago, even much less than that, were too low in grade to be salable, are now eagerly taken on the former reports and examined closely to see if they are as represented, or if they can be made to show either an extension of former tonnages or an improvement in iron content. In any event they are wanted and are mined. The new mines are in large part of these classes, and this is true, not only of the Mesabi range, but of all the others; it is as characteristic of the Menominee as of any other Lake Superior district. While several new mines are reported from the Mesabi district, for example, there are not to exceed two or three that are really new finds, and one of these is on lands that have been wanted by explorers, who felt sure they contained ore, for many years, but have been held out of reach by the owner until he was ready to carry on exploration himself.

Lead and Zinc.

Lead and zinc are closely associated in nature, their ores commonly occurring in conjunction, especially their sulphide ores. There is less association of their oxidized, or carbonate, ores, since in the process of oxidation the original zinc sulphide is converted first into sulphate, which is very soluble and may therefore be leached away by some action of nature; but in a large number of cases, as for example at Leadville, Colo., the occurrence of pure lead-carbonate ores above the water level is followed by the occurrence of mixed lead and zinc sulphides below the water level. Both lead-sulphide ore and zinc-sulphide ore occur alone, but the occurrence in association is more common, and the importance of the joint consideration of the two metals from the industrial stand-

point increases as the oxidized ores are exhausted and the smelters have to fall back on the sulphide ores, which have already become by far the more important, both in the metallurgy of lead and zinc, all over the world.

It will be observed from a study of the literature of economic geology that the deposits of both lead and zinc ore, whether in association or alone, form most kindly in connection with a dolomite or limestone country rock. Most of the great lead and zinc ore deposits of the world occur in formations of those rocks.

In their metallurgy there is also an intimate association of the two metals. In the first treatment of the ores, by jigging or other methods of separation, there is generally obtained a galena concentrate, which goes to the lead smelter for the recovery of its lead content, and a blende concentrate, which goes to the zinc smelter for the recovery of its zinc content. With few exceptions, the crude ore has first to be separated in some such manner. The limitations of mechanical practice do not, however, permit a clean separation of the minerals to be made, save in rare instances, and the lead concentrate consequently almost always contains some zinc, and vice versa the zinc concentrate contains some lead. The presence of zinc is objectionable to the lead smelter and the presence of lead is objectionable to the zinc smelter, but in neither case does the presence of the other metal in limited proportion prevent successful smelting. But while the lead smelter is bound inevitably to lose all the zinc contained in the lead ore that he smelts, the zinc smelter may recover a large proportion of the lead in the zinc ore, after the zinc itself has been extracted. Thus a very large proportion of the pig lead produced in Belgium is recovered from zinc-ore residues, and this practice has been inaugurated in the United States and is without doubt destined to increase in importance.

Finally, the chief use for pig lead is in the manufacture of white-lead pigment, and one of the large uses of zinc is in the manufacture of white pigment, which in the trade is a direct competitor of white lead. But white lead and zinc oxide are to a large extent used in a pigment compounded of both, so that it is conceivable that the lead and zinc which existed originally in the same ore deposit and were mined and separated by a common operation, might be smelted by a combination process and finally after conversion into finished products might be mixed again for use in the arts and be subject to common dissipation under the action of weather and time.

The Open Door in Metallurgy.

The communications of two well known engineers, who have recently been making an extensive metallurgical journey in the United States, which is printed in another column, is particularly noteworthy; not so much for their appreciative expression of thanks for the friendly attention received from American metallurgists, as because it once more bears witness to the freedom with which the results of metallurgical practice in this country are exhibited to the profession at large. There are some special works in this country to which admission is refused, but in general our great metallurgical plants are perfectly open to all who desire to inspect them, and especially is that true of the copper-smelting plants of the West.

We do not intend to discuss the advantages of this policy, which have repeatedly been pointed out by ourselves and by others, especially Professor Douglas, who is himself the best exponent of the policy of the open door. There are no concerns in the world which are more liberal in disclosing through the professional contributions of the members of their staffs and the throwing wide open of the doors of their works, than those of which he is at the head; and also there are no concerns which are more progressive and successful in their mining and metallurgical practice. We have no doubt that Professor Douglas would still say, what he has repeatedly said in his own professional papers, or rather would emphasize the opinion, that the advantages derived from the general exchange of professional knowledge far outweigh any other considerations.

It is to be admitted that there are some special cases wherein secrecy is justifiable, but in the great majority of cases it is both unnecessary and unwise. In many cases it is either a cover of bad practice or the manifestation of the foolish idea that one may take advantage of the good things of others while preserving to himself his own. The best object-lessons for the latter class are attendance at the meetings of technical societies, at which matters of technical practice are discussed; and a few metallurgical journeys during which it will be observed that most managers are anxious to improve their practice, by learning what others are doing, and are willing to show freely and explain their own. After a little while, even the most secretive must come to the conclusion that advantage, not harm, results from such frank interchange of practice and opinion and will be ready to throw open his own works, and perhaps even contribute to the professional papers.

Gold Mining in Siberia.

For a long time Russia has held the fourth place among the gold-producing countries of the world, its output as is well known being derived chiefly from Siberia, but comparatively little has been known in the outside world as to the industrial and technical conditions which exist there. During the last two or three years Siberia has been visited by several well known American and British engineers, in behalf of syndicates interested in exploiting new gold fields. Their reports have exhibited considerable diversity of opinion as to the future of Siberian gold production, and especially as to the prospects of foreign companies which might be led to invest there. In this connection, the article of Professor Tovey, published in this issue, is of particular interest, communicating as it does the opinions of one who is resident in the country and thoroughly acquainted with its conditions.

In 1905 there was rather a large falling off in the gold production of Russia, but the prospecting work which was carried on during the summer, in spite of the war, resulted in a good many successful discoveries, wherefore the season of 1906 was expected to show a noteworthy improvement in the results of gold mining.

However, in view of the serious internal troubles which the Empire is experiencing, it would not be particularly disappointing if the output in 1906 fails to exceed that of 1905, although it is doubtless a fact that the gold-mining industry of Siberia is less affected by the present troubles than any other branch of the mining industry of Russia. Nevertheless, one of the great drawbacks to Siberian mining has long been the scarcity of capital, and inasmuch as new enterprises must be financed chiefly in St. Petersburg, it would appear that the gold-mining industry cannot escape evil effects of the present unsettled conditions.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Cable Addresses of Advertisers.

Sir—I desire to call the attention of advertisers in your JOURNAL to the advisability of stating their cable addresses in their advertisements. To your readers in the United States, of course this would be of no importance, but to the large number of your readers who reside in foreign countries, especially those which have bad postal service, it would be convenient to know the telegraphic addresses of the concerns with whom it might be desired to transact business.

For example four months ago I posted a letter to a concern in New York, which is a large advertiser in the JOURNAL. I desired full information and especially prices relating to some machinery which I needed to use in the near future. Whether my letter did not arrive or the answer to it failed to reach me, a few days ago I was obliged to telegraph for the desired information.

Fortunately, I happened to be in the capital and not in the country, where at some places communication exists only during a part of the year. I looked for a list of the telegraphic addreses of business concerns in New York, but found only one of an ancient date, which was of no use.

If your advertisers would publish their cable addresses in connection with their advertisements, they would greatly facilitate business with foreigners, especially those who reside in remote parts of the world. Z. S. BEYL.

Buenos Aires, Argentina, Aug. 24, 1906.

The Open Door in Metallurgy.

Sir—We have just completed an extended tour of the principal copper-smelting districts of the States, with the object of studying the recent developments of this industry as practised here.

It is not our object in writing to you to give our opinions on what we have seen, but rather to bring to your notice the courteous manner with which we have been received at the works we have visited. In every case we were given access to all departments of the works, and our numerous questions were met with the fullest information. Further than this we have been offered blue-prints of points that especially interested us. We have obtained much valuable information from our visit, and the time occupied has been amply repaid by the knowledge acquired of the different methods applied to suit the varying conditions.

It was very instructive to notice how the peculiar difficulties, which exist to a greater or less degree in every instance, had been met and overcome; and it is only by visiting several works in succession that the skill exercised in meeting these difficulties can be fully appreciated.

It is our wish to tender, through the columns of the JOURNAL, our thanks to the managers and superintendents for their courtesy, and we would express the opinion that the "open-door" policy practised here tends to the rapid advancement of metallurgical knowledge by the free exchange of discussion and experience. We wish we could say that smelting concerns in other countries were as free and open as we have found them here; but though this is not the case at present, there is, we believe, a tendency to relax the restrictions usually in force. Our remarks apply chiefly to copper smelting, though we have visited some lead smelters and gold mills; and we have no doubt that, with proper credentials, these works would be equally open.

As it is not our wish to secure advertisement, we beg to sign ourselves by the use of initials only, but we enclose our cards. V. and P.

New York, Sept. 20, 1906.

Questions and Answers.

Diamantina, Brazil.

Will you inform me how best to go from Honduras to Diamantina, Brazil? I, with two associates, desire to go there in search of diamonds, as we have heard the place is very rich. We shall be obliged for any information as to the subject that you can give us. G. V.

Answer—According to information that we have received from highly reliable sources, Diamantina is a good place to avoid. Mining men who have been there report that it is a very much overestimated district, and say that opinion cannot be too strongly emphasized.

Electric Zinc Smelting Furnaces.

Is there such a thing as an electric zinc smelting furnace? If so, is there any one in successful operation? A. S. McM.

Answer—There are many electric zinc smelting furnaces, but the only one which is in successful operation is the DeLaval furnace, which is in use at three works in Norway and Sweden. These works and the DeLaval patents are controlled by a company in which Beer, Sondheimer & Co., of Frankfurt a M., Germany, are largely interested.

The inventor of the furnace is C. P. G. de Laval. Although his furnace may properly be said to be in successful operation, as we have stated above, there are, nevertheless, serious difficulties connected with it. The whole problem of electrothermic zinc smelting is still in its infancy, and involves one or more questions which have not yet been satisfactorily solved.

Iron-Ore Freight Rates.

Can you give me data on the cost of hauling by rail the iron ores in the Lake Superior region? What I should like especially to know, is the average cost per ton-mile, from the mines to the Lakes. H. H.

Answer—Iron-ore freight rates from Lake Superior mines to shipping piers approximate 1c. per ton-mile. It is impossible to give precise figures, because on no range in the region do roads charge on a ton-mile basis and mines 50 miles apart, on a single range, pay the same freight to Lake Superior. Rates from all Mesabi range points to the lake are 80c. per ton. The distances vary from 60 miles, which is the haul by the Duluth & Iron Range road from Biwabik to the lake, to 130 miles, which is the distance by the Great Northern from Nashwauk to its docks. The average ore haul on the Duluth & Iron Range road from the Mesabi range is about 65 miles; the ton-mile rate is, therefore, 1.20c. Average haul via the Duluth, Missabe & Northern is 80 miles, next year slightly farther, by reason of the development of distant mines; the ton-mile rate, therefore, is 1c. Average haul over the Great Northern is 120 miles; the ton-mile rate is 0.66c. From Lake Superior to the two Vermilion range groups of mines is 70 and 90 miles; the rates are respectively 90c. and $1, or 1.28 and 1.1c. per ton-mile. From Gogebic range mines to Ashland port varies from 40 to 52 miles; probably the tonnage average is 45 miles. The rate is 40c., or 1.1c. per ton-mile. From Ishpeming and Negaunee the distance to Marquette port is 15 and 12 miles respectively, the rate is 25c., or 1.66 and 2c. per ton-mile. This is the highest rate on Lake Superior, and naturally so, as the distance is least. From Republic and neighboring mines to Marquette is 37 miles, from Humboldt 27, and the rates are 30c. From all Menominee range points to Escanaba port on Lake Michigan, the flat rate is 40c., and the distance varies from 40 to 60 miles, the rate from 1 to 0.66c. All these rates are expressed in terms of gross tons. Vessel rates from the various ports to Lake Erie vary from 75c. from Duluth, Two Harbors and Ashland, to 70c. from Marquette and 60c. from Escanaba. The average water carriage from Duluth and Two Harbors is 880 miles and from Marquette it is 630 miles. From Escanaba including shipments to South Chicago, the average water haul is about 500 miles.

The Kiddie Hot-Blast System for Copper-Smelting Furnaces.

BY E. JACOBS.*

In the hot-blast system invented and patented last year by Thos. Kiddie, of Vivtoria, B. C., for several years smelter manager for the Tyee Copper Company, Ltd., of Ladysmith, Vancouver island, B. C., a principle has been successfully adopted, which is entirely different from anything previously devised in copper smelting practice. This new principle is long travel of the air through thin steel pipes at the comparatively low temperature of the gases passing from the blast furnace into the dust chamber.

It is a well known fact that the temperature of gases issuing from blast furnaces is about 400 to 600 deg. F. With a view to utilizing the waste heat from such a source, an experiment was made at the Tyee Copper Company's smelting works (which were designed and erected by Mr. Kiddie), by running a circular steel pipe, 6 in. in diameter, the entire length of the dust chamber and back to the furnace where it was connected with one of the tuyeres. This experiment was continued over a period of three months with the following results: (1) The average temperature obtained for that time was 345 deg. F., and (2) the tuyere under this hot blast was always brighter and more easily kept in working order than the tuyeres simultaneously receiving cold blast under a like pressure and furnace conditions.

It having been conclusively demonstrated that the heating of the blast in this manner was quite feasible and decidedly advantageous, a double horizontal flue immediately over the furnace, and a pipe or tube, described as the "absorption pipe," running the full length of the dust chamber and return, were constructed. This pipe was so designed as to give the greatest heating surface and at the same time keep its cross section down to the lowest practicable limit; its shape is such that the distance through which the heat must radiate to its center is reduced to a minimum, viz., approximately 4 in. in a circular pipe of equal area.

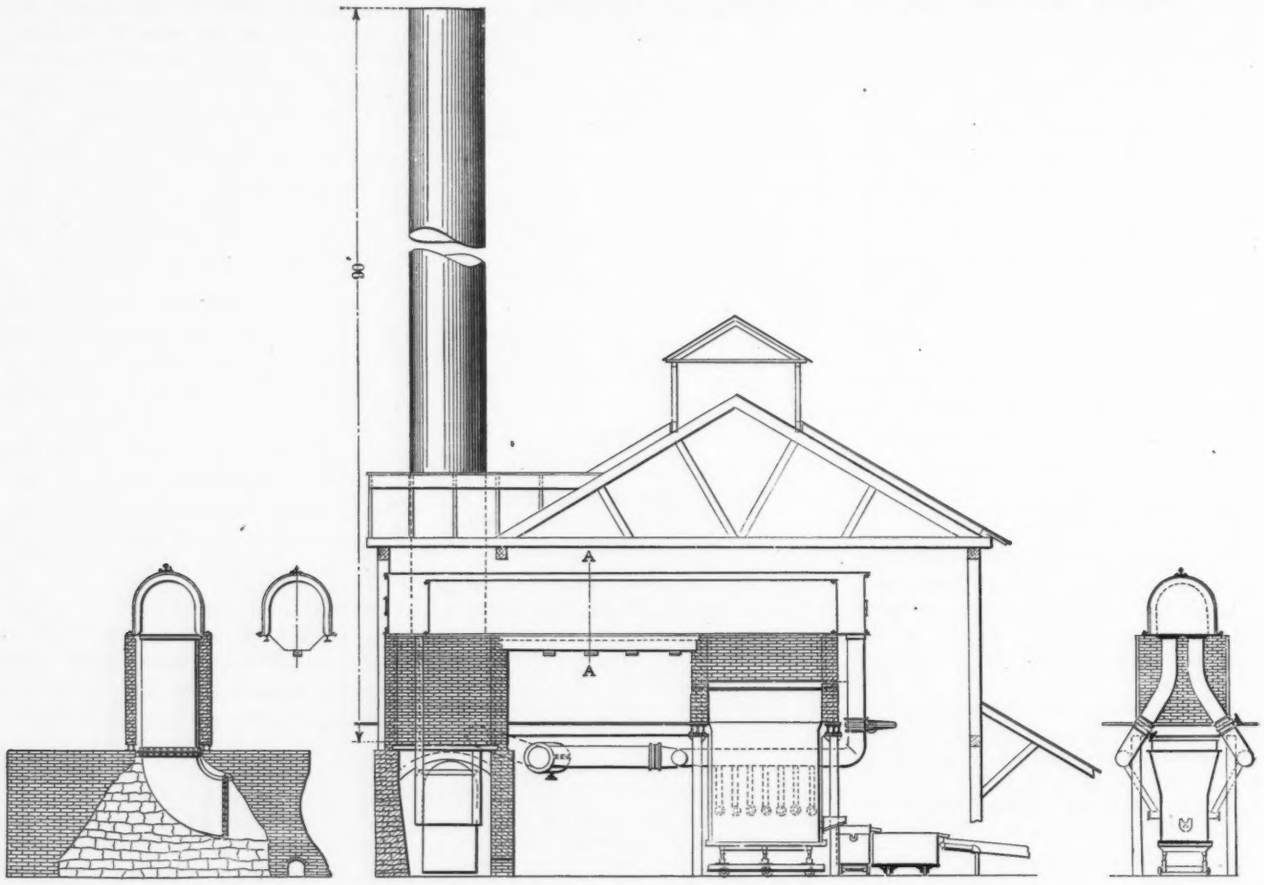
The new system, for which Mr. Kiddie has since been granted both Canadian and United States patents, was in due course installed on a scale equal to the full capacity of the 250-ton blast furnace in operation at the Tyee Copper Company's works. The installation was completed in July, 1905, and proved very effective. The specification accompanying Mr. Kiddie's Canadian patent (No. 96,665) includes the following:

"My efforts have been directed to expose the air blast very fully to the heat of the waste gases in the flues, and that in a gradual manner, exposing it first to the heat of the dust chamber of the flue farther from the furnace and thereafter to the greater heat of the direct gases close to the furnace. By this means I not only impart a high temperature to the blast, by which alone I am enabled to derive full economy of fuel and advantageous results in smelting, but by the long exposure and gradual increase of temperature the air tube and jacketed linings last longer, as they are not exposed to extremes of temperature on opposite sides of the sheets of metal of which they are constructed.

"My system is thus in contra-distinction to the short travel at high temperature in thick cast-iron pipes, as in the ordinary hot-blast stove.

"A further economy in the utilization of the waste heat of the furnace is effected by decreasing the velocity of the gases through the flues and dust chamber to the minimum by introducing a damper in the furnace stack; by which means also the amount of cold air drawn in at the feed doors is correspondingly reduced and a more complete settling of the particles of flue dust is insured.

"Fig. 1 is a general plan showing the



GENERAL LONGITUDINAL AND TRANSVERSE SECTIONS.

*Editor. *British Columbia Mining Record.*

application of my system to an existing blast furnace having a separate flue-dust chamber. Fig. 2 is a similar view showing a modified arrangement, appropriate to an installation of several furnaces. Fig. 3 is a vertical section on the line *A A* in Fig. 1. Fig. 4 is a cross section of the jacketed flue leading from the blast furnace to the dust chamber. Fig. 5 is a cross section to an enlarged scale of the heat-absorttion pipes in the flue-dust chamber. Fig. 6 is a side elevation showing a means for supporting and providing for the expansion of the absorption pipes in the flue dust chamber.

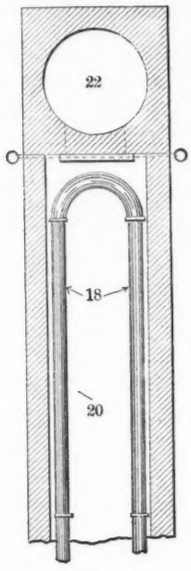


FIG. 1.

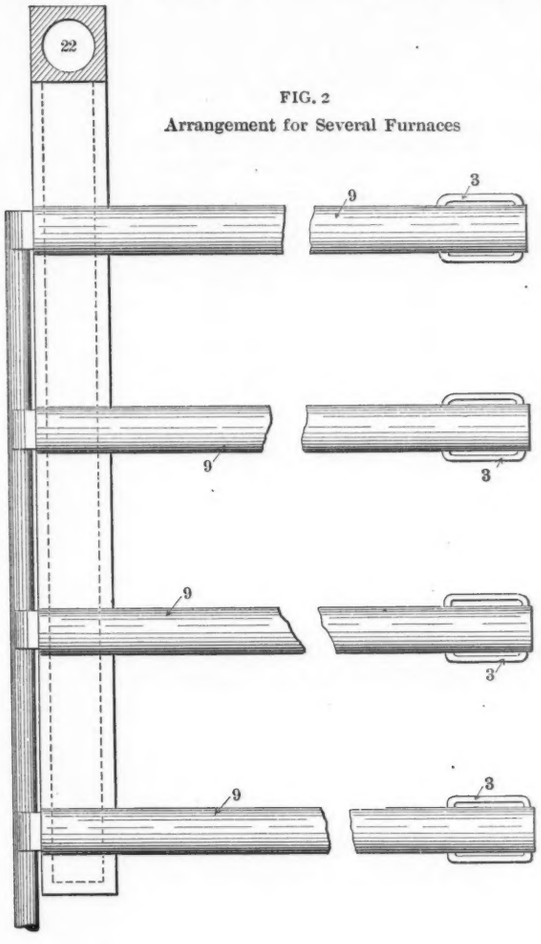
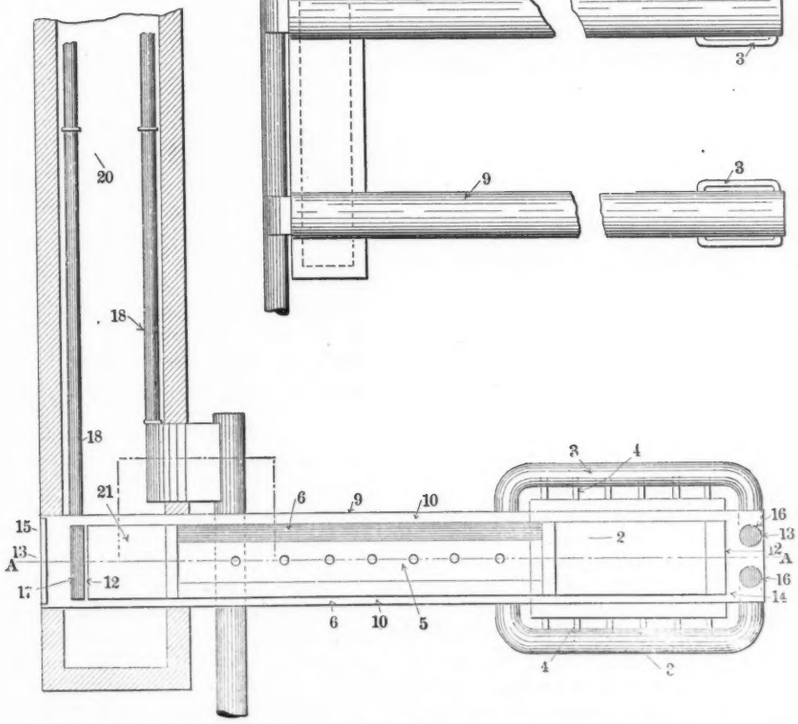


FIG. 2
Arrangement for Several Furnaces



"On referring to Figs. 1 and 3, 2 represents the blast furnace and 3 the bustle pipes from which the tuyere pipes 4 deliver the blast to the furnace. From the top of the furnace 2 a jacketed flue 5 conveys the furnace gases to the dust chamber 20. In cross section the flue 5 is preferably shaped as drawn in Fig. 4, the top and sides being inclosed by a plate 6 carried around and outwardly flanged as at 7 to be riveted to corresponding outward flanges on the cover plate 9, which cover plate incloses an air space 10 between it and the lining plate *b*, through which the air of the blast is passed on its way to the furnace tuyeres in a manner to be described later. The bottom of the flue is formed of a trough-shaped plate 8 laterally flanged to rest on the girders 11 and form seats on which the flanges joint of the flue lining and its cover plate rest. The cover plate 9 extends beyond the ends 12 of the flue 5 and by means of end plates 13 jackets these ends with air spaces 14 and 15 which are in connection with the air space 10 which jackets the flue. The space 14 at the furnace end of the flue 5 is connected by down pipes 16 to the bustle pipes 3 on each side, and the space 15 at the opposite end is connected by a shallow, flat pipe 17 in the downtake 21, which delivers the furnace gases from the flue 5 to the flue-dust chamber 20. The flat pipe 17 is connected in the flue-dust chamber to the absorption pipe 18 to be described later.

"The air for the blast is delivered through the pipe 25 and, as shown in dot and dash lines in Fig. 3, a connection 26 furnished with a stop valve will permit the air to be delivered direct to the bustle pipes when for any reason such delivery may be found necessary, valves being also provided on the down pipes 16. The blast-delivery pipe 25 is connected by a flattened pipe 27 to the absorption pipe 18 before referred to in the flue-dust chamber 20. This absorption pipe extends along one side of the chamber toward the chimney and returning along the other side is connected by the pipes 17 to the air jackets of the flue 5.

"The absorption pipe 18 is made of thin sheet metal and is in cross section laterally narrow and vertically deep, the upper side being formed as an inverted V to prevent any considerable settlement of the flue dust upon it, and the under side rounded for convenience of manufacture. It may be supported within the dust chamber in any appropriate manner that will provide facility for its expansion under heat, but is preferably suspended from the roof 30 of the flue-dust chamber on rollers somewhat in the manner illustrated in the right-hand side of Fig. 5 and in Fig. 6.

"The flat sides of the pipe may be reinforced to enable them to withstand, without distention, the internal pressure of the blast. On the right-hand side of Fig. 5 such reinforcement is attained by longitudinal bars on each side and stay bolts between, but the particular manner in which this is done is not material to this application. The course of the blast air is as follows: From the delivery pipe 25 it passes through the connection 27 to the absorption pipe 18 in the flue-dust chamber where it is exposed very completely to the heated gases therein. The air then passes up the flat pipe 17 in the downtake 21 to the jacket space 15 and along the flue jacket 10 to the space 14 and thence down the pipes 16 to the bustle pipes.

"It will thus be seen that the air is gradually heated in its progress to the furnace, being first exposed to the less highly heated gases in the dust chamber and later, just before discharge through the tuyeres, to the direct heat of the furn-

ace. All pipes and cover plates where exposed to the external air are protected by a covering of heat non-conducting material to prevent loss of heat by radiation. In these circumstances no great extremes exist on opposite sides of the plates of which the pipes and flue lining are composed and the life of the material of which these parts are made is thereby lengthened. This is an important feature as is evidenced by the short life of hot-air stoves at present in use, in which a

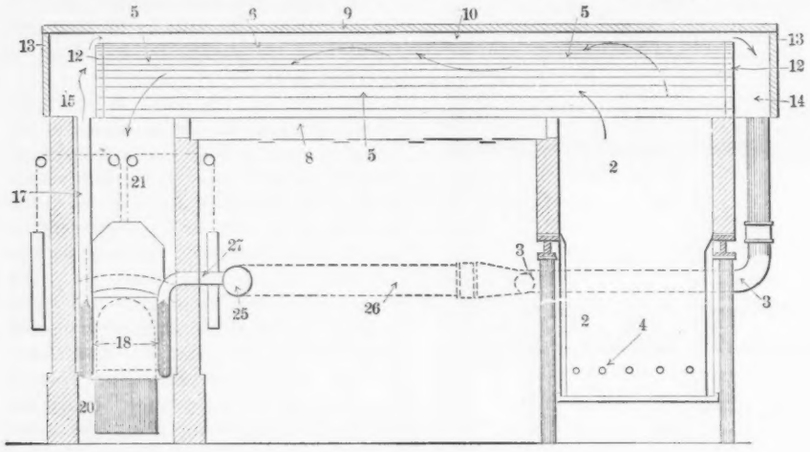


FIG. 3

series of cast-iron air pipes is exposed to the extreme heat of the furnace gases close to the furnace itself. These shallow, flat absorption pipes in the flue-dust chamber offer an ample heating surface in proportion to the cross-section area of the pipes, and their design is such that every opportunity is offered for endwise expansion by the heat of the flue so that no straining of their structure takes place.

"Where a series of blast furnaces is installed it may be found convenient to connect them to one flue-dust chamber as illustrated in plan in Fig. 2 when, by extending the flue 5, the absorption pipe 18 in the flue-dust chamber may be dispensed with altogether and the blast pipe 25 connected direct to the jacket space of the flue 5. The form of the flue 5 and its inclosing air jacket is designed to accommodate itself to expansion and contraction due to variation of temperature and to the lateral extension due to the blast pressure within the jacket space."

The following observations on Kiddie's hot-blast system are submitted:

Cost of Installation—It may be stated that the cost of installing this system is, approximately, 50 per cent. less than that of the ordinary hot-blast U-pipe stove; also that Kiddie's system can be applied to any modern blast copper furnace, without disturbing the brick work of the furnace, above the feed floor.

Wear and Tear—Owing to the comparatively low temperature, viz., 400 to 600 deg. F., of the gases passing through the dust chamber and the long travel and small cross-section area of the heating or absorption pipe therein, the wear and tear is reduced to the lowest limits. In other systems the air jackets are so constructed as to extend too close to the flames and, as a consequence, the steel plates soon become burned and the stay bolts tear through the plates by reason of the excessive expansion and contraction of the latter. On referring to the accompanying diagram it will be noted that the lowest part of the double horizontal flue leading from the dust chamber to and over the furnace is kept sufficiently high above the charge in the furnace to prevent any burning of the steel plates taking place, thus insuring long life to these plates and avoiding what in other systems is a heavy cost for renewals. The outer jacket, being in sections, can in case of need be readily taken apart, while all the joints, having outside flanges, are equally acessible at all times.

Smelting Economy—The saving of coke and the superior oxidizing power of this system is exhibited by the following average results of three months' hot-blast practice as compared with cold blast under similar furnace conditions:

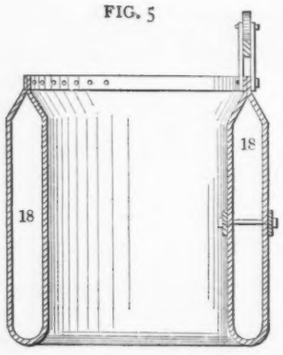
Running With Hot Blast—The charge consisted of 37 per cent. roasted ore, containing 6.32 per cent. sulphur and 4.08 per cent. copper; and 63 per cent. raw ore, containing 16 per cent. sulphur and 4.08 per cent. copper; coke used, calculated on the ore smelted, 9.36 per cent.; coke used, calculated on the mixture smelted, 7.70 per cent. The matte produced contained 42 per cent. copper; sulphur to copper —3.04 sulphur to 1 copper.

Running With Cold Blast—The charge consisted of 63.62 per cent. roasted ore, containing 6.32 per cent. sulphur and 4.08 per cent. copper; and 36.38 per cent. raw ore, containing 16 per cent. sulphur and 4.08 per cent. copper; coke used, calculated on the ore smelted, 13.93 per cent.; coke used calculated on the mixture smelted, 12.97 per cent.; matte produced contained 42 per cent copper; sulphur to copper—2.41 sulphur to 1 copper.

These records show that as compared with cold-blast practice the hot blast made a saving of 33 per cent. coke on ore smelted, and 41 per cent. on charge, while the tonnage smelted was practically the same. As regards oxidation, the respective percentages of roasted and raw sulphide ore used in the furnace charges were reversed, the hot blast producing equally good results with a two-thirds proportion of raw ore as the cold blast with a one-third, the product being in both cases a 42 per cent. copper matte. This represents a saving in ore-roasting cost of 50 per cent.

The following general annual average analysis of ore from the Tyee mine, which ore formed by far the greater part of that smelted during the period over which the

FIG. 5



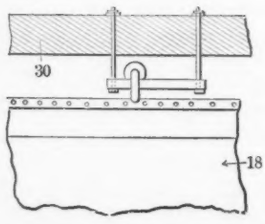


FIG. 6

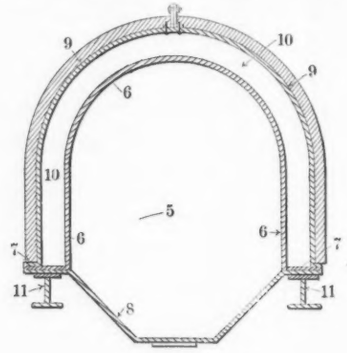


FIG. 4

operations giving above mentioned results were spread, may be of interest in this connection: Copper by electrolytic assay, 4.08 per cent.; silver, 2.67 oz. per ton; gold, 0.131 oz. per ton; iron, 10.49 per cent.; zinc, 7.36 per cent.; silica, 13.48 per cent; alumina, 7.01 per cent.; barium sulphate, 37.63 per cent.; lime, 2.04 per cent.; magnesia, trace; sulphur (as sulphides), 6.32 per cent. The general analysis of slag is as follows: Copper, 0.41 per cent.; gold, trace; silver, 0.14 oz. per ton; iron oxide, 17.25 per cent.; zinc oxide, 6.47 per cent.; barium oxide, 28.57 per cent.; calcium oxide, 6 per cent.; silica, 31.42 per cent.; alumina, 10.73 per cent.; magnesia, trace.

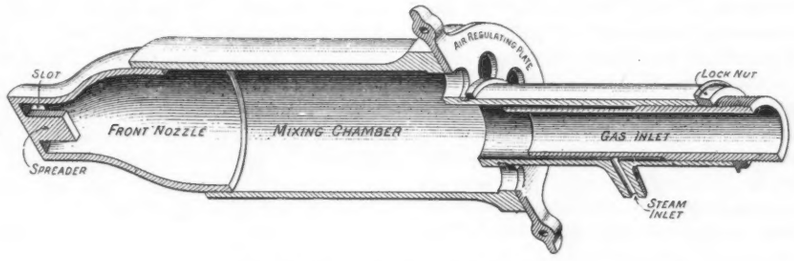
General—In general, it may be said that a furnace when working with hot blast is more easily kept in good condition than when using cold blast; that a greater oxidation of sulphur, zinc and iron in the ore takes place in smelting with the former; that decreasing the velocity of the waste gases through the dust chamber—as was done by Mr. Kiddie by placing a regulating door or a damper in the flue stack, after careful observation of effects of such decrease—results in a great recovery of the waste heat of the furnace, and a decided increase in the quantity of flue dust recovered; and that with a hot blast considerable economy is effected in the quantity of coke used in smelting, this last being one of the chief objects of Mr. Kiddie's hot-blast system.

Iron Mask Mine Settlement.

It is announced that the Iron Mask mine at Kamloops has been purchased by the Consolidated Mining and Smelting Company, of Canada. This mine was operated for several years by the Iron Mask Gold Mining Company, of Spokane, Wash., during which period some 7000 ft. of development work (including a 450-ft. shaft) were done and 17,655 tons of ore shipped. Operations were profitable, but in 1899 the company brought suit against the Centre Star Mining Company, the question involved in the action having been the question of extra-lateral rights claimed by the defendant company under the old location law. The action attracted widespread notice at the time, and among the expert mining engineers called to give evidence were the late Clarence King, Dr. R. W. Raymond, Louis Janin and others. The case was adjourned. Afterward an agreement was reached by the litigants, and a settlement effected out of court. The heavy cost of the proceedings severely affected the Iron Mask Company, which continued operating its mine until the summer of 1901, having meanwhile raised money by assessment of its stock, and by borrowing. Since that time the mine has not been worked. It passed into the possession of D. C. Corbin, of Spokane, who acquired it by foreclosure, and now he has sold it outright to the Consolidated company, which also owns the adjoining Centre Star and War Eagle mines, from the workings of one of which the Iron Mask ore-shoots will be explored and mined. The mine is situated about five miles from Kamloops. It is developed to a depth of 700 ft., with long drifts at the 200-, 300-, 400-, 500-, and 600-ft. levels. At the 500-ft. level the orebody is 68 ft. wide, and at the 600-ft. its width is 108 ft. Formerly the company operated a concentrator and a small smelter, but latterly the grade of the sulphide copper ore has increased sufficiently to make it profitable to send the entire output to the Trail smelter, to which previously only the higher grade ore was shipped. The ore yields about $25 per ton net profit. About two carloads daily, or 1800 tons per month, are shipped, traction engines and horse teams both being employed in hauling it to the Canadian Pacific railway, three miles from the mine. A year ago only about 60 men were employed at the Iron Mask, but now there are 160 on the payroll.

The Branch Natural Gas Burner.

This is a new burner for the combustion of natural gas under horizontal tubular and water-tube boilers. The gas is admitted to the burner through a 2-in. inlet pipe and passes into a mixing chamber where the necessary amount of air is mixed with the gas before it is discharged through the front nozzle. This nozzle has slots so that the flame produced is of a fan shape and spreads out under the boiler. Several advantages are claimed for the burner, principal among them being that it is easy to regulate accurately the ratio of the air to the gas so as to product perfect combustion and a uniform flame near the front end of the boiler. The jacket of steam which is provided around the gas intake pipe serves as a preheater for the gas before it enters the mixing chamber and promotes combustion. It is made by the National Equipment Company, of St. Louis, Mo.



THE BRANCH NATURAL GAS BURNER.

Emmaville in the northern portion of New South Wales and formerly known as Vegetable Creek, has produced since 1872, without machinery, tin to the value of £6,000,000. The district is known to be still rich in tin, and preparations are being made to introduce a large amount of Victorian and other capital.

The Toronto Mineral Exhibit.

BY PHILLIPS THOMPSON.

The Timiskaming & Northern Ontario Railway Commission is showing a fine collection of ores from Cobalt and the neighboring mineral areas at the Canadian National Exhibition now in progress at Toronto. The exhibit includes ores from nearly all the noted mines and prospects. In addition to smaller samples from the University, Foster, Gilpin, McKinley-Darragh, Silver Leaf, Silver Queen, etc., three large nuggets from the Nipissing mines are shown, weighing respectively 485, 180 and 150 lb., with an estimated aggregate value of $1200. Three bars of pure silver from the McKinley-Darragh mine, containing 136 oz., are shown, the product from 90 lb. of ore. The Columbus mine is represented by cobalt and cobalt crystals, silver and galena. Copper-gold ore is displayed from the Williams copper-nickel mine, Widdifield township, and the Dunlop & Gibson property, Bear island.

A noteworthy feature of the collection is four samples of silver-copper-nickel ore from the Gillies timber limit, now being developed by the Ontario Government, furnished by the Department of Mines, which also sends a slab of silver from the Tretheway mine, value $500, and some fine specimens of native silver from the Glendinning mine on Cross lake. The comprehensive character and tasteful arrangement of the exhibit is highly creditable to F. B. Mosure who is in charge of the collection.

Another exhibit of much interest to miners and metallurgists is that of the Stanley Smelting Works, Bannockburn, Ont., which operates the only lead smelter in eastern Canada, in connection with two lead mines. They show numerous samples of ore and pig lead. Since the smelter went into operation, about the middle of last February, the works have turned out over 1000 tons of pig lead.

The Société des Mines de Zinc du Ghergur, of Paris, is developing deposits of calamine at Ain Ruah, Kef Semmah and Gebel Anini, in the commune of Ghergur, arrondissement Sétif, department of Constantine, Algeria, which are said to show about 150,000 tons of ore, and to be capable of an annual production of 12,000 to 15,000 tons.

The New Volume of "The Mineral Industry."*

BY R. W. RAYMOND.

The fourteenth volume of "The Mineral Industry," edited by Walter R. Ingalls, and covering the year 1905, appears somewhat late, if news be better than truth, but remarkably early, if truth be better than news. As a compendium of comprehensive and trustworthy information, it is not inferior to the best of its predecessors; and Mr. Ingalls deserves praise for his skilful labors in the preparation of this volume. In fact, it should be noted that the editorial work was finished at the end of May, and the time which has since elapsed has been occupied by the details of printing, proof-reading and binding. Only an experienced editor can realize how much patient toil and how much delay are involved in these mechanical sequences to the comparatively simple act of composition or compilation. In this case, not even the carefully prepared figures given in preceding volumes of "The Mineral Industry" have been repeated without correction. The statistics of former years have been laboriously revised upon later information, so that this volume supersedes as authority the statements of this class presented in its predecessors as the most reliable which could be made at the time of their appearance. Too much praise cannot be given to this patient process of approximation. Nothing is more discouraging or misleading to the student than the retention of inaccurate figures, once recorded, to vitiate all future estimates.

As in former years, the list of contributors comprises many eminent names. Besides Mr. Ingalls himself and Messrs. Hobart, Judd, Meeks, Parsons, Rice and Yale, of the editorial staff of the ENGINEERING AND MINING JOURNAL, there is a goodly array of 44, including presidents and professors of American mining schools, representatives of State geological surveys, officers of professional societies and consulting engineers of wide repute.

I cannot do better than copy this list of contributors and contributions in full, since no description of mine could give in the same space an equally clear notion of the range and value of the contents of this book:

A. J. Aubrey, chemist, Laclede Firebrick Company, St. Louis (The refractory uses of bauxite); Prof. L. S. Austin, Michigan State School of Mines (Progress in the metallurgy of copper in 1905); Robert N. Bell, State mine inspector, Idaho (Lead in Idaho; Gold and silver in Idaho); Robert B. Brinsmade, professor of mining, New Mexico State School of Mines, Socorro, New Mexico (Pyrites mining and milling, St. Lawrence county, N. Y.; Talc in northern New York); A. Selwyn-Brown, consulting mining engineer, New York City (Gold mining in Nevada); George E. Collins, consulting mining engineer, Denver, Colo. (Gold and silver mining in Colorado); George H. Cushing, Cleveland, Ohio (The Cleveland iron market); J. V. N. Dorr, consulting engineer and general manager, Buxton & Big Bonanza mines, Lead, South Dakota (Gold mining in South Dakota); James Douglas, president Copper Queen Consolidated Mining Company, New York City (Copper in Arizona); Stanley A. Easton, general manager, Bunker Hill & Sullivan Mining Company, Kellogg, Idaho (Lead mining in the Cœur d'Alene); F. Julius Fohs, assistant geologist, Kentucky Geological Survey, Louisville, Ky. (Fluorspar); L. W. Friedman, Birmingham, Ala. (The Alabama iron market); Charles H. Fulton, president, South Dakota School of Mines, Rapid City, South Dakota (Cyanidation during 1905); Harold C. George, instructor, School of Mines and Mining, Western University of Pennsylvania, Allegheny City, Penn. (Pennsylvania oil fields); Erasmus Haworth, State geologist and professor of geology, University of Kansas, Lawrence, Kan. (Oil and gas development in the mid-continental field); Frederick Hobart (Coal and coke; Gold and silver, Iron and steel); H. O. Hofman, professor of metallurgy, Massachusetts Institute of Technology, Boston, Mass. (Improvements in sampling and assaying; Recent improvements in lead smelting); H. C. Hoover, consulting mining engineer, London, England (Gold mining in Western Australia); J. P. Hutchins, consulting mining engineer, New York City (Gold dredging in 1905, Mining in the Yukon); W. R. Ingalls (Copper; Lead; Tin; Zinc); E. Jacobs, editor of *British Columbia Mining Record*, Victoria, B. C. (Gold mining in British Columbia); Alfred James, vice-president, Institution of Mining and Metallurgy and consulting engineer, London, England (Progress in gold ore treatment during 1905); R. D. O. Johnson, consulting mining engineer, Denver, Colorado (Phosphate rock in Tennessee); Edward K. Judd (Aluminum; Antimony; Chromium and chrome ore; Corundum and emery, Graphite; Nickel and cobalt; Sulphur and pyrites; The seaboard bituminous trade); Chas. R. Keyes, president, New Mexico State School of Mines, Socorro, New Mexico (Gold mining in New Mexico; Copper mining in New Mexico); Robert W. Lesley, vice-president, Society Testing Materials; vice-president, American Cement Company; past president, Association American Portland Cement Manufacturers, Philadelphia, Penn. (Cement); Capt. J. B. Lucas, mining engineer, Washington, D. C. (Coal and coke in Montana); S. F. Luty, Pittsburg, Penn. (The Pittsburg iron and steel markets); James W. Malcolmson, consulting engineer, El Paso, Texas (Gold and silver mining in Mexico); F. S. Mance, department of mines, Sydney, New South Wales (Gold mining in New South Wales; Tin mining in New South Wales); V. F. Marsters, geologist of the Republic of Peru, Lima, Peru (Petroleum in Peru); Reginald Meeks (Potassium salts; Sodium and sodium salts; Tungsten); John B. Minchin, mining engineer, Oruro, Boliva (Tin in Bolivia); E. W. Moore, general manager, Galena Iron Works, Platteville, Wis. (Zinc mining in Wisconsin); E. Morrison. (The Chicago iron and steel markets); D. H. Newland, assistant State geologist, Albany, New York (Garnet; Graphite in New York); Robert K. Painter, formerly superintendent Cabin Branch mine, Virginia (Pyrites mining and milling in Virginia); F. W. Parsons (Petroleum); James W. Paul, chief mine inspector, Charleston, W. Va. (Coal and coke in West Virginia); William B. Phillips, general manager, Chisos Mining Company, Terlingua, Texas (The quicksilver industry in Brewster county, Texas); Claude T. Rice (The emery industry at Chester, Mass.); Robert H. Richards, professor of mining, Massachusetts Institute of Technology, Boston, Mass.; (Progress in gold milling in 1905, Progress in ore dressing and coal washing in 1905); Paul Speier, metal merchant, Breslau, Germany (The Silesian zinc industry in 1905); Bradley Stoughton, adjunct professor of metallurgy, Columbia School of Mines, New York City (Progress of the metallurgy of iron and steel in 1905); C. E. L. Thomas, Calumet, Mich. (Copper in Michigan); J. A. Van Mater, general manager, Bertha Mineral Company, Pulaski, Virginia (Lead and zinc mining in Virginia); H. A. Wheeler, consulting mining engineer, St. Louis, Mo. (Lead in southeastern Missouri); W. Fischer Wilkinson, engineering staff, Consolidated Gold Fields of South Africa, Ltd., London, nEgland (Gold mining in the Transvaal; Gold mining in Rhodesia); Dwight E. Woodbridge, consulting mining engineer, Duluth, Minn. (Lake Superior iron mines); Chas. G. Yale (Gold mining in California, Quicksilver in California); Jesse A. Zook, Joplin, Mo. (Lead in southwestern Missouri; Zinc in Missouri and Kansas).

Besides this, the work of high authorities appears in quotation. Thus, the admirable discussion of the present metallurgy of aluminum, presented by Professor Richards, of Lehigh University,

* "The Mineral Industry," Vol. XIV, edited by Walter Renton Ingalls. 1906; 739 pp.; price, $5.00. Published by the ENGINEERING AND MINING JOURNAL.

at the Bethlehem meeting of the American Institute of Mining Engineers, is contained in Mr. Judd's chapter on aluminum; and abundant quotations and references in other articles put at the reader's disposal the latest technical literature.

To say that some of these contributions are more comprehensive and valuable than others, is not to disparage any of them. Judged by the evident purpose of the writer and the nature of his opportunity and materials, every one of them is worthy of praise. But in many cases there was nothing to do but add one year's record to the description of an industry already exhaustively chronicled up to date in preceding volumes, and this additional record may have involved no important novelty. All that can be required of a contributor is that he shall not overlook such novelties in the field he has undertaken to cover. With this preliminary explanation, I proceed to mention a few of the articles which have impressed me upon a first reading as especially noteworthy.

Professor Austin's summary of the progress of 1905 in the metallurgy of copper is a very full and interesting compilation, largely from foreign sources, not easily accessible to American students. Thus, M. Guillet's discussion of the alloys of copper with aluminum, zinc and manganese, in the *Revue de Metallurgie* of February, 1905, is here summarized, with numerous graphic illustrations; and Dr. Peters' admirable series of articles in the German periodical, *Metallurgie,* is condensed into a clear statement, and thus made available (I think for the first time) to those who do not read German. Moreover, leading examples of American practice in the smelting and refining of copper at Houghton, Mich., Rapid City, S. Dakota, Anaconda, Mont., Ducktown, Tenn., Cananea, Mex., etc., and of foreign practice at Kedabeg, Russia (where petroleum is used as fuel) are reproduced from authentic sources. The whole article is a worthy appendix to a standard manual of copper metallurgy, and all the existing handbooks are incomplete without it.

Professor Brinsmade's account of the deposits and mining of talc in northern New York, gives a picture of a characteristic industry, developed under modern industrial conditions. A few years ago no one would have expected the opening of mines to furnish material for the manufacture of paper.

President Fulton's account of the progress of cyanidation during 1905 is intelligent and helpful, mainly as a guide to the literature of the year. Without entering into details, it indicates where they may be found; and it contains sundry general conclusions and criticisms which seem to me to be discriminating and sound. The burning questions and the principal improvements in this department are justly declared to concern the treatment of slimes in general, and the cyanidation of ores containing silver.

Prof. Hofman's article on "Improvements in Sampling and Assaying" is what might be expected from this accomplished and conscientious author. That his critical survey of the year's literature in this department has revealed nothing of special significance is not his fault. For his elaborate review of "Recent Improvements in Lead Smelting," Professor Hofman had a more fruitful field, and this article, covering both ancient and modern, American and foreign practice, is intensely interesting, as well as professionally valuable.

Mr. Hutchins' article on "Gold Dredging in 1905" is full of vigor and hard common sense. The modern dredging process does not require the expenditure of large sum for pipe lines to bring water a long distance and deliver it under high pressure, or for bed-rock tunnels, to "bottom" auriferous deposits and furnish an escape for their tailings. It carries forward the dredge, in a traveling lake of its own making, provides the necessary hydraulic jet by steam pressure, and leaves the tailings behind without fear of "débris" suits or injunctions. Naturally, these features have powerfully attracted inventors, investors and adventurers, and, in many instances, dredges improperly constructed, or deposits of impracticable character have been included in enthusiastic, but ill-fated schemes. Such a sane discussion of its limitations and conditions as Mr. Hutchins gives is a wholesome corrective of wild schemes, while it does not at all impair the reasonable conclusion that the dredging process is a great improvement, which has come to stay, and which, prudently and skilfully handled, will immensely increase the production of gold by the exploitation of deposits otherwise economically unavailable at the present time.

Mr. James' brief but suggestive account of the "Progress in Gold-ore Treatment during 1905," will be all the more welcome to American readers in that it chronicles chiefly the practice of South Africa and the Australian colonies, of the progress of which the author, as an officer of the Institution of Mining and Metallurgy, in London, has special opportunities to keep himself posted.

Mr. Lesley's account of the cement industry, though much briefer than the importance of the subject would justify, is a stimulating and suggestive view of one of the greatest advances in modern constructive engineering.

Mr. Phillips furnishes, in his account of the quicksilver-mining industry in Texas, an addition to our knowledge of the mineral resources of that vast, rich and still (to most of us) little known State.

I need not say that the contributions of Professor Richards on the year's progress in gold milling ore dressing and coal washing are thorough and masterly. These subjects he long ago made his own; and so long as he continues actively to study, criticize and record the advances of theory and practice in these fields, no one will contest his leadership.

Professor Stoughton's review of progress in the metallurgy of iron and steel is confined to a discussion of the improvements and changes of practice which seem to the author to have permanent value. Under this head, he includes, as real novelties, the Gayley dry-air blast and the application of electric smelting to the production of iron and steel. In both cases, his judgment is unquestionably correct; but in another particular, I think he has failed to realize the overwhelming significance of a feature of modern practice which he indeed mentions, but only to say that it has made no further progress in this country. I refer to the use of gas engines, run upon blast-furnace gas. In this country, only the Lackawanna Steel Company, I believe, has thus far adopted this improvement; and this company has encountered, as is usually the case with new devices, more or less difficulty in its operation. But if Professor Stoughton had been with us this summer, in England and in Germany, in which latter country engines furnishing more than 300,000 horse-power are already running upon the waste gases of blast furnaces, which we Americans simply throw away, he would not have lost the chance of declaring, as he might have done with perfect safety, that this great new economy is sure to conquer us, as it has victoriously conquered our brethren beyond the sea. In fact, the ironmasters of Germany, handicapped by scanty supplies of lean and impure ores, inferior fuel, and sundry other unfavorable conditions, have developed a degre of thorough and precise scientific management and minute and manifold economy far surpassing the present features of average American practice. We could learn much from them now, with immediate advantage. By and by, when we shall have skimmed and consumed the rich cream of our iron-ore deposits, and come face to face with more severe conditions, we shall be glad to learn many things to which we are now, in our wealthy way, relatively indifferent.

I must put an end to this desultory review, for lack, not of materials for further comment, but of available time on my part, and space on the part of the ENGINEERING AND MINING JOURNAL. As I am quite aware, my notice of this volume contains little or no adverse criticism, and therefore reads like a "puff." But I cannot help that: I have gone through the book and honestly set down what I thought about it. It is a good book; and, being a good critic, I am obliged to say so, at whatever sacrifice of such reputation as I might have won by slashing and destructive comment.

At the very end of my notice, however, I will add a bit of blame. The volume comprises not only a detailed table of con-

tents, but also an alphabetical index. If it had lacked the latter altogether, it is probable that I would have decided, either not to notice it at all, or to damn it vigorously; for I think such a book, without a sufficient index, is a crime against the public in general and an insult to me in particular.

Now the index to this volume is a thousand times better than none, and much better than it might have been; but, at the same time, it is worse than it might have been. It lacks "cross-references." Four or five additional pages would have made it satisfactory; and ten would have made it perfect, comprising every locality, subject or person mentioned in its pages. I will not pursue this theme, which is a hobby of mine; and I must in candor confess that, with a little patience, and perhaps after one or two unsuccessful experiments, one can find with the aid of this index whatever one knows to be somewhere in the book.

Abstracts of Official Reports.

Mount Morgan Gold Mining Company.

The twenty-first annual report of this company states that since the beginning of mining operations the chlorination works have treated 2,813,354 tons of ore for a return of 3,006,960 oz. of gold, valued at £12,121,776, and blister copper valued at £85,842. The total yield of the mine was valued at £12,212,367, and the average gold contents of the ore as mined was 1.05 oz. During the year ending May 31, 1906, the total quantity of ore and tailing dealt with in the reduction works was 280,718 tons, of which 38.7 per cent. was sulphide and 48.2 per cent. was oxidized ore. The average value of the former was 10.82 dwt., or 54.94s. per ton. The average value of all the ore treated was 9.16 dwt. gold or 38.9s., as compared with 9.71 dwt. gold, or 41.24s. in the same period of 1905. The total production of gold last year was 114,521 oz. fine.

The recovery of copper by leaching tailing is increasing. The total quantity of copper precipitate recovered last year was 389 tons assaying 78.3 per cent. of copper.

Since Jan. 20, 1906, one of the new copper furnaces has been kept constantly in blast producing auriferous copper matte. During 131 furnace days a total of 22,153 tons of ore were treated with a consumption of 2310 tons of coke. The ore was high in silica and required the employment of a large amount of limestone flux, but no smelting difficulties were met with. On April 18 the new bessemerizing plant was started and has produced over 200 tons of blister copper.

The mine manager reports that steam shovels have operated in the open cut to a depth of 315 ft. The 450-ft. level has been fixed as the limit to which the open cut will be carried down, and it has been decided to extract all the ore immediately below this level before the open-cut levels attain such a depth. The depleted ground will be filled in and secured so as to form a buffer between the open and underground workings, so as to avoid troubles which previously arose when carrying on both kind of workings close together.

All ground above the 650-ft. level producing sulphide ore continues to be worked by the square-set system. The gold-copper ore is obtained from the chambers on the 750-ft. level. The chambers on this level are assuming large dimensions. It has been found that wide areas of ground can be taken out without supporting timber, so that a system combining the good features of the underground open cut and full stope methods has been introduced with satisfactory results. The system consists in carrying up the chambers in sections, leaving sufficient broken ore lying on the level to form successive working floors, the ore not being drawn off until all the ore in the section has been removed up to a sub-level. After the ore has been taken out, the section is filled, excepting the necessary ore passes. The top of the filling forms the floor of the sub-level. This process is repeated to the next sub-level. The sub-levels are 25 ft. apart, and the system has the advantage of not locking up large quantities of broken ore. The filling material is waste from the surface open-cut workings. The system affords considerable economies over the previous methods of stoping employed.

During the year, 4324 ft. of driving and 2370 ft. of sinking were carried out. The inclined shaft was carried down to the 930-ft. level. Electric locomotives have been installed in the lower levels and their employment has been found economical and satisfactory.

During the year 4000 tons of chamber acid were made in the sulphuric-acid works, and were used in the production of chlorine for extracting gold in the chlorination works, and in extracting copper from the tailings. During the year satisfactory experiments were made with a pyrite burner. It is proposed to build a complete set shortly and to utilize pyrite in the production of sulphuric acid exclusively. Hitherto, over 1000 tons of sulphur were used annually in acid production.

The directors have in view the purchase of an iron mine for fluxing purposes, as the auriferous copper ore in the mine is deficient in iron for smelting purposes. They have secured options over several large iron properties within a radius of 30 miles of Mount Morgan and doubtless will shortly acquire the most suitable one.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Published Week Ended Sept. 18, 1906.

831,056. MINING DRILL—Benjamin V. Gilmore, Red House Shoals, W. Va. Filed Feb. 14, 1906.

831,067. METHOD OF REDUCING METAL-BEARING MATERIALS—Axel H. Helander, Pueblo, Colo. Filed Dec. 26, 1905.

831,106. CHECK-LOCK FOR MINE CARS—Samuel Rudolph, Lansing, Kan., assignor of one-half to Job E. Jones, Lansing, Kan. Filed Dec. 4, 1905.

831,165, 831,166. ROASTING FURNACE—Frank Klepetko, New York, N. Y. Filed Nov. 6, 1905.

831,232. ORE-ROASTING FURNACE—Wm. A. Maddern, Boulder City, Western Australia, Australia. Filed April 7, 1903.

831,241. TRIP FEEDER FOR CAR HAULS. Lewis J. Robb, Pittsburg, Pa., assignor to Heye & Patterson, Pittsburg, Pa. Filed July 13, 1906.

831,252. ORE SEPARATOR AND CLASSIFIER—Edward J. Swyny, Balmain, and Samuel G. Plucknett, Newtown, New South Wales, Australia. Filed Sept. 7, 1904.

831,280. PROCESS OF TREATING VANADIUM ORES—James O. Handy, Pittsburg, Pa. Filed June 2, 1906.

831,332. CENTRIFUGAL SLIME FILTER—Elmer W. Durfee, Salida, Colo. Filed Jan. 16, 1906.

831,427. MANUFACTURE OF FERRO-PHOSPHORUS—John J. Gray, Jr., Rockdale, Tenn. Filed Nov. 5, 1904.

831,516. MINING MACHINE—Charles Mead, Murray, Idaho. Filed Feb. 15, 1905.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended Sept. 15, 1906.

12,516 of 1905. BRIQUETS—J. Noll and E. Trainer, Frankfort a. M., Germany. In the manufacture of briquets of fuel or ore by the use of refuse wood pulp, improvements in the method of drying before pressing the mixture.

14,468 of 1905. ROCK DRILL—W. D. Jones and W. O. Pierce, Penmaenmawr, and Wm. Treglown, London. An improved percussive hand rock drill.

14,869 A of 1905. FLUE-DUST SEPARATOR—G. A. Mower and W. G. Bassett, London. An improved centrifugal apparatus for the separation of dust from blast-furnace gases.

18,218 of 1905. HEAT CONSERVATION—A. and F. Waddell, Dunfermline. Method of utilizing the heat of hot coke drawn from coke ovens and gas retorts.

19,874 of 1905. REFRACTORY BRICK—W. P. Ingham, Middlesbrough. In building blast furnaces, the use of bricks having their sides at an angle with the radius of the circular section.

24,900 of 1905. GAS DETECTOR—J. McCutcheon, Edinburgh. An improved portable apparatus for detecting the presence and volume of fire damp in mine gases.

25,371 of 1905. ROASTING FURNACE—H. F. Brown, Chicago. A smelting process, consisting in throwing finely divided ores in a shower down a shaft and injecting at various points in the shaft currents of reducing gases in such a way as to obtain a whirling downward motion.

7876 of 1906. OPEN-HEARTH FURNACE—P. C. Bagley and the South Durham Steel and Iron Co., Stockton-on-Tees. Improvements in tapping open-hearth furnaces, with the object of increasing the capacity of the furnace.

10,303 of 1906. ZINC REDUCTION—A. H. Imbert, Paris. A modification of the process for obtaining zinc from sulphide by means of iron, consisting in melting the sulphide in a bath of lime and ferric oxide, and adding iron in the molten state, thus obtaining practically the whole of the zinc, and in a very short time.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Hudson H. Nicholson is in Goldfield, Nevada.

F. E. Folsom, Toronto, Ont., has recently returned from the Yukon.

C. W. Purington is examining mining property in southeastern Idaho and northeastern Utah.

John E. Fern, of Scranton, Penn., has been appointed chief electrician for the Erie Coal Company.

C. H. Krause, of Calumet, Mich., has taken charge of the property of the Ida-Montana Development Company in Butte.

Mr. Frederick S. Harris, of Chicago and Goldfield, Nev., has been appointed consulting engineer for the C. O. D. mine at Goldfield.

John Fulton, of Johnstown, Penn., returned home September 18, from Porto Rico, where he has been engaged on professional work.

F. L. Bosqui is at Milwaukee, consulting with the Allis-Chalmers Company, on the plans for the Montana-Tonopah mill, at Tonopah, Nevada.

Norman Fraser, manager of the Roche Percee mine at Estevan, has been appointed inspector of mines for the province of Alberta, Canada.

William L. Cobb, of San Francisco, has been appointed mining engineer for the Kern County Consolidated Gold Mines, Ltd., at Piute, California.

Horace Mayhew, president of the Cape Breton Coal, Iron and Railway Company, has resigned, owing to the recent death of his son and ill health.

C. L. Constant, of New York, is visiting Butte in company with J. Parke Channing, in the interest of the Lewisohn General Development Company.

Juan Felix Brandes, of Denver, Colo., has spent several months in Berlin and Paris on business. He is now in London, and expects to return to Colorado in November.

R. B. Brinsmade has resigned his position as professor in the New Mexico School of Mines at Socorro, and is at present in Colorado, making an examination of some mining property.

F. Wallace White left Cleveland, Ohio, Sept. 22, for an extended Western trip, principally to investigate one of the largest claims at Eldorado cañon, in the Searchlight district of Nevada.

Thomas L. Wilkinson, consulting mechanical engineer, has returned to Denver, Colo., from a three months' business trip to the East. Mr. Wilkinson's offices are in the Boston Building, Denver.

Ross E. Browne, who has been for three years past in the Transvaal and in London as consulting engineer with Wernher, Beit & Co., passed through New York last week on his way from London to San Francisco.

H. W. Hardinge, who has been professionally engaged in Gunnison county, Colorado, during the past three months, passed through Denver a few days ago on his way to New York and probably to South America.

E. C. King has resigned the position of assistant superintendent of the Arizona Smelting Works, to accept the position of superintendent of the Southwest Smelting and Refining Company's smelter, at Jarilla Junction, New Mexico.

Lester S. Grant, formerly with the Findley Consolidated Gold Mining Company, at Cripple Creek, Colo., is now in New York, on his way to take charge of the cyanide plant of the Inca Mining Company, at San Domingo, Peru.

J. D. Rogers, for the past four years assistant superintendent of the blast furnace of the Salem Iron Company, Leetonia, Ohio, has been made superintendent of the blast furnaces of the Ashland Coal and Mining Company, Ashland, Kentucky.

H. M. Kimball has given up the position of chemist with the Boston & Montana Copper Company at Great Falls, Montana, to take a similar position at the Murray plant of the American Smelting and Refining Company, near Salt Lake City, Utah.

H. Hayman Claudet, of the firm of Claudet & Wynne, Rossland, B. C., is now visiting Denver, Colo., on business in connection with the new vacuum Elmore oil process. A small testing plant is now in operation at Henry B. Wood's ore-testing works in Denver.

Aeneas McCharles of Sudbury, recently deceased, left $10,000 to Toronto University as a fund the interest of which is to be distributed in prizes to Canadians making practical discoveries or inventions for the treatment of ores, or lessening the dangers from electricity.

Frank D. McEntee has resigned his position as mining engineer with the Northwestern Mining and Exchange Company, of DuBois, Penn., to accept a position as engineer in charge during the construction of a blast furnace for the Hamilton Steel and Iron Company, of Hamilton, Canada.

Paul Johnson writes to correct a personal item—which was sent us by a correspondent and appeared in the JOURNAL of Aug. 21—to the effect that he proposed to give up charge of the Alaska Smelting Works at Hadley, Prince of Wales Island, Alaska, and to return to Sweden. Mr. Johnson says that he has no intention whatever of retiring from his present position as manager, or of leaving the United States, and adds: "I will say that I started planning and designing these smelting works in 1903, had them built in 1905, and that they are the first smelting works in Alaska which have done any work of consequence so far. I blew in the smelter in December, 1905, and during the time the smelter has been in operation, on and off since that time, I have smelted 56,750 tons of ore, producing 3235 tons of matte, containing 2,700,400 lb. of copper, 2155 oz. of gold and 15,140 oz. of silver, a total of $550,000 gross value."

Obituary.

John Ernst, of Detroit, Mich., committed suicide in Haileybury, Ont., recently. He was despondent over the rejection by the mining inspector of his title to three claims on which he had been working.

James A. Burden died at his residence in New York, Sept. 23, aged 73 years. He was born in Troy, N. Y., in 1833 and immediately after graduating from the Rensselaer Polytechnic Institute entered the famous Burden Iron Works, of which his father was then head. His connection with those works continued all his life, though for some years past he had not been active in the management. Mr. Burden invented a number of machines and devices used in his works, and for many years was deeply interested in processes and methods of manufacture. He was a member of the American Society of Civil Engineers and the American Society of Mechanical Engineers; also of the Engineers' Club, of which he was at one time president.

Edward Worthington, aged 93, died in Pittsburg, Sept. 18. Mr. Worthington was born at Llanidloes, North Wales, coming to this country in 1851, and settling at Brady's Bend, Armstrong county, residing there until 1890, when he removed to Pittsburg and located on the South Side. He was considered a man of exceptional worth in the management of coal and ore mines. In Plynlymon, Wales, he was manager of lead mines. Later he was manager of coal mines near Tredegar, South Wales. In this country he was prominently connected with the Brady's Bend Iron Company's mines in Armstrong county. His special work was ventilation and drainage; in these he was a recognized authority. The deceased retired from business about 25 years ago.

John E. Fry, one of the pioneers in the operation of the bessemer steel process in this country, died suddenly at Johnstown, Pa., Aug. 30, aged 69 years. He was born at Norristown, Pa., and went to Johnstown as a young man, where he learned the iron molders' trade. After serving in the army during the Civil War he became superintendent of the Cambria Iron Company's foundry and continued in that capacity until the completion of the bessemer steel plant, under the superintendency of Capt. Robert W. Hunt. Mr. Fry had meanwhile been a close student of this branch of the company's business, and when Captain Hunt resigned in 1873, Mr. Fry succeeded him and developed brilliant qualities as a steel-works mana-

ger. He afterward turned his attention to open-hearth steel practice and for a time managed the Pernot open-hearth furnaces of the Springfield Iron Company at Springfield, Ill., where he overcame difficult problems and succeeded in making the plant operate satisfactorily. Subsequently for a number of years he had charge of the converting department of the Wheeling Steel and Iron Company, Wheeling, W. Va., where he contributed greatly to the successful production of low-carbon steel for general purposes. In the manipulation of the converter he was an adept and his advice was sought by owners of various steel works when results were not satisfactory.

Societies and Technical Schools.

Appalachian Engineering Association—The fall meeting of this association was held at Welch, W. Va., on Friday, Sept. 14. After an interesting business meeting the association turned its attention to the reading of papers and discussion. On Saturday the association spent the day in inspecting the United States Coal and Coke Company's plants at Gary, W. Va., and vicinity. Four of the eight plants were visited and a highly instructive trip resulted. The association will hold its annual meeting at Charleston, W. Va., on the first Saturday in February, at which time the members will discuss and take action on the threatened discontinuance of the State appropriation for the geological work in West Virginia, which has thus far been so well advanced.

University of California—The Hearst Memorial Mining Building, the gift of Mrs. Phoebe Hearst to the University of California, in memory of her husband, Senator George Hearst, is now completed with the exception of some of the interior finishing, and some time during the present college semester the building will be dedicated and formally turned over to the University. The new building has been in process of construction for the past four years. It is an imposing structure of white granite, and when completed will represent an outlay of over $500,000, which does not include the equipment. The building is of steel and white dressed granite with red tiled roof. Massive granite pillars adorn the main entrances. Within is every convenience for a modern mining college. A great court from basement to roof, surrounded with balconies on each of the four floors will occupy the center of the building and will accommodate the more massive pieces of machinery. Laboratory, lecture rooms, offices, class-rooms and museums will occupy the various floors. The equipment will be complete and will consist of the most improved modern machinery and apparatus.

Industrial.

The Link-Belt Company announces the transfer of its New York city offices from 49 Dey street to the Barclay building, 299 Broadway.

The large order for 1104 Johnston vanners for the Utah Copper Company's new mill, mentioned in our issue of Sept. 1, was given to the Risdon Iron Works, of San Francisco, and not to the Union Works, as a clerical error made the statement. The Johnston vanner is made by the Risdon Iron Works.

The Wade & Wade Company, Los Angeles, Cal., has installed in its laboratory a complete up-to-date testing plant for cements. Tensile, setting and boiling tests, etc., can be made as desired. The company has lately installed a new improved Dow penetration machine for asphalts, and is prepared to make tests of oils, asphalts, and similar material.

The Traylor Engineering Company, of New York, announces that it has entered into an agreement with the C. W. Knox Machinery Company, of Denver, Colo., by which that firm becomes exclusive representative for the sale in Colorado of Traylor machinery for mining, sampling, milling, amalgamating, cyaniding, concentration, smelting, rock crushing, cement making and fuel briquetting.

Sanderson & Porter, engineers and contractors, of New York, announce that Richard S. Buck has been admitted as a member of the firm. Mr. Buck is now consulting engineer of the Department of Bridges, New York City, and will retain this connection for a time at least. The firm now consists of Edwin N. Sanderson, H. Hobart Porter, Francis Blossom, Richmond Talbot and Richard S. Buck.

The Wile Power Gas Company, of Rochester, N. Y., reports sales of its automatic pressure and suction gas producers to the Superior Steel Company, of Carnegie, Penn., the Ransome Concrete Machinery Company, of Plainfield, N. J., the Columbia Nut and Bolt Company, of Bridgeport, Conn., and other concerns.

E. G. Soltmann, 125 East 42nd street, New York city, has published a form of builders' sub-contract, which is based on the "uniform contract" approved by the American Institute of Architects and National Association of Builders. A sample copy will be mailed upon receipt of a 2c. postage stamp.

Among the orders recently booked by the Power and Mining Machine Company, Cudahy, Wis., may be mentioned the following: 24 sets of 36x16-in. crushing rolls, and four sets of 54x20-in. rolls for the Utah Copper Company, Garfield, Utah. Three additional converter stands and nine shells for the Detroit plant of the Copper Queen Consolidated at Morenci, Ariz. An interesting feature in connection with this installation is the elimination of the usual pressure pumps and accumulators, as the hydraulic power for tilting the converters will be taken direct from the reservoir in the mountains through the high-pressure pipe line. Other orders include eleven 6-ft. Chilean mills for the Real del Monte y Pachuca, Pachuca, Mex.; six 6-ft. Chilean mills for the Golden Cycle, Colorado City, Colo.; 60 agitators for the United States Mining Company, Salt Lake City; three 48x240-in. water-jacketed copper furnaces for the British Columbia Copper Company, Greenwood, B. C.; three 56x240-in. water-jacketed copper furnaces for the Balaklala Mining Company, Redding, Cal.; two 46x162-in. copper and lead furnaces for the Oaxaca Smelting and Refining Company, Oaxaca, Mexico; one 56x180-in. water-jacketed copper furnaces for the Arizona Smelting Company, Humbolt, Ariz.; two converter stands, electrically driven, and four shells 96x108-in., also five 10-ton matte ladles, for the Selby Smelting and Lead Company, South San Francisco; four converter shells, 84x126-in., for the Colusa Parrott Mining and Smelting Company, Butte, Mont.; two converter shells, 84x126-in. for the Shannon Copper Company, Clifton, Arizona.

Trade Catalogs.

Receipt is acknowledged of the following catalogs and circulars:

Western Tube Company, Kewanee, Ill. High Duty Metal; pages 8; paper 4x6 in. 1906.

Deming & Co., Salem, Ohio. Catalog G, Pumping Machinery; pages 110, illustrated; paper 10x6 in. 1906.

Geo. V. Cresson Company, Philadelphia, Penn. Cast-Iron Pulleys; Pp. 70, illustrated; paper, 6x9 in., 1906.

Nernst Lamp Company, Pittsburg, Pa. The Lighting of Public Buildings; pages 32, illustrated; paper 7x10 in. 1906.

Stanley G.—I. Electric manufacturing Company. Types L4 and L14 Arc Lamps; pages 12, illustrated; paper 6x8 in. 1906.

Hanna Engineering Works, Chicago, Ill. Catalog No. 3, The Hanna Riveter; pages 34, illustrated; paper 5x8 in. 1906.

Joseph Dixon Crucible Company, Jersey City, N. J. "Through Frisco's Furnace." Pp. 28, illustrated; paper, 10x7 in., 1906.

Traylor Engineering Company, New York City. Catalog 1, Stamp Milling Machinery. Pp. 55, illustrated; paper, 8x10 in., 1906.

The Cyclone Drill Company, Orrville, O. Catalog of Prospecting and Well Boring Machinery. Pp. 84, illustrated; paper, 6x9 in., 1906.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1204, Gerard Roll Feeder. Pp. 4, illustrated; paper, 10x12 in., August, 1906.

H. W. Johns-Manville Company, New York City. The Manville Dry Powder Fire Extinguisher, pages 8, illustrated; paper 3x5 in. 1906.

Power and Mining Machinery Company, Cudahy, Wis. Catalog No. 6, Roasting, Smelting, Refining. Pp. 156, illustrated; paper, 6x9 in., 1906.

Laclede Fire Brick Manufacturing Company, St. Louis, Mo. High-Grade Refractory Materials for Lining Cement Rotary Kilns. Pp. 5, illustrated; paper, 5x8 in., 1906.

Baldwin Locomotive Works, Philadelphia, Penn. Record No. 58. Ceremonies at the Unveiling of the Statue of Matthias W. Baldwin, June 2, 1906. Pp. 20, illustrated; paper, 9x5 in.

Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo. The Hydro-Electric Power Plant of the Nevada Power, Mining and Milling Co. Pp. 16, illustrated; paper, 3x6 in., 1906.

Construction News.

Washington, California—Arrangements are being made to erect a mill at the Iliad mine. J. W. and H. Williamson are the owners.

Carrietown, Idaho—A concentrating mill is to be put up at the Silver Crown mine. C. C. Ruthrauff, of Hailey, Idaho, has charge.

Ducktown, Tennessee—It is reported that the owners of a tract adjoining the Tennessee Copper Company's property are preparing to open it up and will need machinery. E. Breckenridge Moon, Asheville, N. C., has charge.

Chatsworth, Georgia—The Georgia Talc Company is about to install machinery for preparing talc for market, and will need grinders and power plant. J. Frazier Glenn, Chatsworth, is president.

Oak Point, South Carolina—A phosphate property at Oak Point, near Beaufort, is to be opened up; washing and drying plants will be erected. The property is owned by the Virginia-Carolina Chemical Company; the main office is at Richmond, Virginia.

Greendale, Ohio—The Columbus & Hocking Clay Construction Company informs us that it now has plans and specifications ready for the large brick plant to be built at Greendale, Hocking county, Ohio, and is soliciting bids from contractors who are in position to figure on erecting the buildings. There will be a large central power station, and machine shop, one large factory building, one drier, two fan houses, six rectangular kilns, one continuous kiln, two stock sheds and numerous small buildings for the employees, to be erected. R. A. Magly, Columbus, Ohio, is general manager.

Special Correspondence.

San Francisco. Sept. 18.

It is reported here that the lands of the Central Pacific Railroad, which have been so many years withheld from sale, will shortly be placed on the market. This matter is of peculiar interest to northern California at this time, for it means that large tracts between Sacramento and the Oregon State line in one direction and the Nevada State line in another will be thrown open to sale and settlement. Throughout this region are numbers of both developed and undeveloped mines. The miners have hesitated to do prospecting on these railroad lands, but doubtless arrangements will now be made by which they may do so.

Litigation is bothering the Bonanza King Development Company, which owns a group of mines in the Trojan mining district, San Bernardino county. Charles E. Ussher, one of the directors of the corporation, has filed a suit in the Superior Court to have set aside a lease which he claims was given by J. H. Montay, president of the company, C. W. Cadagan, acting secretary, and A. A. Irish, of the directorate, to P. H. Cherry for the purpose of defrauding the stockholders of the Bonanza King Development Company. By the lease, which was entered into Feb. 20, Ussher alleges the mines, machinery, supplies and water-rights of the Bonanza King Development Company were turned over for 15 years to Cherry for a royalty of $1000 a year for each stamp in operation at the mill. Cherry assigned this lease to a company incorporated subsequently with a capital stock of $34,000, the shares being taken by himself and the directors of the Bonanza King Development Company. Ussher wants the defendants enjoined from operating the property under this lease until the matter is adjudicated in court.

It is expected that the Folsom Development Company, R. G. Hanford, manager, will take up on Oct. 1 the option on 2000 acres of vineyard land, water-rights, etc., of the Natoma Vineyard Company, at Folsom, Sacramento county. The Folsom Development Company already owns a few thousand acres bought a few years ago from the Natoma people. The lands purchased, while now planted in vineyards, are considered valuable for their gold contents, which will be recovered by dredging.

The labor strike at the works of the Standard Portland Cement Company, Napa Junction, still continues, and they have closed down since Aug. 29, though the product is just at this time in great demand. The officials of the company filed complaint in the county clerk's office against Federal Labor Union, No. 11,345, of Vallejo, and Leavitt, Ferrogaro, Ogg, Wolf, and others, in which they pray for a perpetual enjoining order from the Court to prohibit hindrance. Strikers are stationed on all roads leading to the works and board all cars which go from Napa to the junction. It is charged that they have intimidated new employees by threats of violence. The latest move in the contest is that the Vallejo Trades and Labor Council has taken steps to have the product of the company placed on the "unfair list" and has wired to the leading central labor bodies in this State, asking that the members of the various building crafts refuse to continue their employment upon works wherein the product of this concern is used.

There have been a number of quartz-mining claims filed in the Siskiyou county recorder's office since the first of the month, and nearly all of them are located between Klamath river, near Oak Bar, and the Oregon State line. There is an extensive, but undeveloped copper belt in that region.

San Diego, which is known in the State as the "gem county," owing to its production of tourmaline, kunzite, etc., emphasizes its title to the name by announcing the discovery of diamonds.

Salt Lake City. Sept. 22.

The Intermountain Exploration Company has filed articles of incorporation here with 5000 shares of the par value of $5 each. The officers are: President, H. E. Smith, of Duluth, Minn.; vice-president, Peter Porter, of Salt Lake; secretary, E. J. Bricker, of Minneapolis; treasurer, Theophilus F. Smith, of St. Paul; who, with Charles D. Rooklidge, of Salt Lake, are directors. E. J. Raddatz is manager.

The annual meeting of the New York Bonanza Mining Company, operating at Park City, resulted in no change in the board for the ensuing year. The total receipts of the year amounted to $44,231, of which $30,000 came from assessments, while the disbursements aggregated $42,682.

The directors of the Lower Mammoth Mining Company, operating in the Tintic district, have decided to call a special meeting of stockholders to discuss the increase of the capital stock from 150,000 to 300,000 shares, the new stock to be sold for development and equipment purposes. The management has decided to continue the winze sunk from the 1200 level to greater depth.

Interest in the Deep Creek region, in the western part of the State, is growing. The construction of the Western Pacific westward from Salt Lake is certain to open up this country with some good paying mines. Already, one property, at Clifton, bids fair to become a copper producer of considerable magnitude.

The directors of the Utah mine at Fish Springs have increased the monthly dividend again and will pay 3c. a share, or $3000, on Sept. 18. This company is mining some high-grade lead-silver ore which is hauled across the desert about 70

miles to Oasis, the nearest railroad station.

The directors of the Daly-Judge have decided to commence the payment of quarterly dividends on Jan. 1 next. While the amount was not definitely determined, it will not be less than 30c. per share. This Park City mine has netted $45,000 monthly during the present year. On Jan. 1 last the company was in debt $231,000, which has been wiped out and the treasury now contains a balance of about $150,000.

Denver. Sept. 22.

A large deal in Cripple Creek property has just been closed by the transfer of the holdings of the United Gold Mines Company, amounting to about 400 acres in the richest part of the district, Bull hill and Battle mountain. Whether the new owners will continue the leasing system is not yet known. At present a number of lessees operate on the property. The amount involved in the deal is stated at about $350,000.

At a meeting in the Chamber of Commerce building a few nights ago, committees were appointed to arrange for the reception and entertainment of the delegates to the approaching convention of the American Mining Congress, which will meet in Denver on Oct. 16.

The executors of the Stratton estate have, through their attorneys, served notice upon Attorney General Miller, that they will file a motion to have that part of the court's order, which provides for the payment of 6 per cent. interest on the amount of the inheritance tax from the date of Mr. Stratton's demise, stricken out. The amount of interest is about $65,000.

The Colorado State School of Mines has opened with about 300 students, many among them from foreign parts.

The output of the Cripple Creek district for the month of August amounted to $1,583,800, derived from a total tonnage of nearly 47,000 tons. The production was divided about evenly between the smelters and the chemical reduction works.

The Taylor Park Mining Company, engaged in mining near Dorchester, Colo., capitalized for $5,000,000, with headquarters in Boston, has been placed in the hands of a receiver, the result of Clarence H. Knight's charge that the company is insolvent. Thomas F. Goodale, of Boston, was appointed to assume charge. It is stated that they owe about $200,000.

The Albuquerque & Cerillos Coal Company, a New Mexico corporation, has leased the Madrid mines of the Colorado Fuel and Iron Company, and will commence to market the product at once, again opening the Santa Fé branch between Madrid and Cerillos.

Duluth, Minn. Sept. 24.

The Republic Iron and Steel Company has undertaken a far more vigorous campaign after iron ore than it has carried on in the past, and is taking properties on both the Mesabi and Vermillion ranges. The last of these is the east half of the northeast quarter of section 25-58-18, for which a royalty of 32c. a ton has been agreed upon. This is on the lower rim of the iron-ore formation, but a little ore has been found on the tract, by exploration carried on some years ago. On adjacent land to the east, farther up on the formation, which here has a northeast and southwest strike, M. H. Alworth and others are finding ore on land owned by them. This tract has long been considered excellent, and is close to a large area owned by the Oliver Iron Mining Company, which was originally in the hands of the Merritts, of Duluth. The Republic Company is also taking lands on the Vermillion range and will start exploration there.

A good deal more work is under way in the exploration of hitherto undeveloped tracts on the Mesabi than was expected at this time, and it now looks as though the coming winter would be one of the most active known to explorers.

An Eastern steel concern has taken a lease on 200 acres near the center of T-56-23 and will explore at once. The Great Northern road has a mine adjoining to the north and the Oliver company one close by to the west. In this district the surface is rather deep and ore not of high grade, but washable.

On the northeast quarter of section 16-58-17, near the Minnewas, some ore is being found.

Pickands, Mather & Company, have taken up several explorations in the Iron River district, this being the first time the company has done anything there. Options have been taken on properties in sections 23 and 25-43-35, near the Riverton mine of the Oliver company and the properties of the Mineral Mining Company. It is said that the Cleveland Cliffs Iron Company is anticipating entrance to this district, and it is certain that this company has been making preliminary examination, but so far as known without having taken any action toward exploration thereabouts.

The Marinette Iron Company, in which officials of the Wisconsin & Michigan railway are interested, has begun shaft sinking in section 6, near Iron mountain, to prove an orebody by crosscuts and test-pits. It is reported that the preliminary work was quite favorable and that a considerable body of fair-grade ore is already shown to exist.

No. 4 oredock of the Duluth, Missabee & Northern Railway is so far completed that one side has been in service this week, and the shipping capacity of the road is correspondingly increased, though it is even yet unable to keep pace with the shipping that presses for cargoes. This pier will have capacity for storage of 119,000 gross tons of ore.

Steamship "Henry H. Rogers," one of the latest of the Steel Corporation's vessels, has broken the record for ore loads by taking from Escanaba to Chicago a cargo of 13,333 gross, or 14,933 net tons. This was on a draft of 21.5 ft., and was possible from Escanaba only, from the fact that connecting channels out of Lake Superior are not deep enough to permit vessels in the Superior trade to load as low. The ship is 600 ft. long.

Scranton. Sept. 24.

According to the report of Chief Inspector James Roderick there were 168,254 persons employed in the anthracite mines of Pennsylvania, Luzerne county being first with 60,734 and Lackawanna second with 40,859. During the previous year there were 161,300 persons employed.

The North Franklin colliery, of the Reading system, in Treverton, is now run entirely by electricity, being the first owned by the company to be equipped in this manner. Everything around and within it is done by electrical power, the breaker and the mine are illuminated by electric lights.

The employees of White & Co., an independent operation, near St. Clair, went out on Friday. The company had been paying the miners 10c. a car extra for loading and the men demanded a laborer for loading with laborers' wages. The demand was refused and the men went out. The company closed the mine.

An inclined plane has been built at the old Anchor colliery, in the Heckscherville valley, for the purpose of hoisting culm, which will be flushed into the old slope to extinguish the fire which has been raging for 37 years. The fire must be extinguished before the mammoth Pine Knot shaft can be fully operated. The colliery is owned by the Reading Company.

The Reading Company also has decided to clear all the mine workings in the Heckerscherville valley of water, to make available large coal deposits which have been covered in drowned-out workings. The coal that will be reclaimed in this manner will make a second breaker necessary in the Coal Castle district.

Improvements are being carried out at the West Brookside colliery, of the Reading Company, which, it is claimed, will increase its producing capacity to that of any other colliery in the anthracite region. A tunnel is to be driven from the inside workings to the surface on the Valley View side. A shaft is to be sunk at this point and all the coal brought to the surface will be sent through the tunnel to West Brookside.

At a meeting of the coal assessors of Northumberland county, it was decided that, henceforth, all mineral lands should be assessed at $500 per acre. It is claimed that at present the average assessment of coal lands in the county is but $131 per acre.

The Delaware & Hudson and the Pennsylvania have recently placed large orders for new coal cars.

London. Sept. 18.

There is some probability of American money being put into the Ymir mine in British Columbia, and arrangements have been made for a discussion of the matter early next month between the directors and the American parties. As your readers will remember, this company paid some good dividends some five or six years ago, but in 1902 shareholders had to put up more money to provide new plant suitable for treating lower-grade ores and to prosecute development on a more extended scale. The company now has an 80-stamp mill, but in spite of developments and of the very best management and professional advice, the amount of ore obtainable is disappointing. Early this year the metallurgical plant was closed down and attention devoted entirely to development. During July and August, the mill started up again, but only 25 stamps were worked. The English shareholders can hardly object to Americans putting up further money for development, for no more capital would be obtainable on this side. Probably the American parties will secure favorable terms for their money, and many English shareholders will kick at having to give away so much of their share in the property. The English shareholders are, however, in somewhat of a corner, and will have to make up their minds to a sacrifice.

A few months ago I mentioned that the Great Cobar copper mine, New South Wales, had been floated in London successfully this time, after a failure by other parties three years ago. The flotation has now been completed, and the property paid for; it was transferred to the new company on Aug. 21. J. D. Kendall arrived on the property early this month. He reports by cable that from Aug. 22 to Sept. 11 (21 days), the ore smelted was 11,300 tons, which yielded 820 tons of matte. The contents of this matte are not given, but Mr. Kendall gives his estimate of profit obtainable from it at £15,000. This gives English shareholders a fair idea of the property as a going concern. By this time the new shaft will have been begun and developments at the 1000-ft. level will have been taken in hand. Your readers will remember that a large sum in cash was paid for this mine to the Australian owners, so large that the greatest difficulty was experienced in getting it together. The reports of Mr. Kendall and Mr. Rolker showed that the proved ore and the probable ore would yield a profit of much more than the capital, with copper at £65, so shareholders may consider themselves in a satisfactory position, and can look forward to further developments with comfortable minds. I ought to add that the company has £150,000 cash in hand available for development and extensions.

General Mining News.

Petroleum Exports—Exports of mineral oils from the United States for the eight months ending Aug. 31 were as follows, in gallons:

	1905.	1906.
Crude	63,757,077	80,495,347
Naphthas	18,683,582	20,515,623
Illuminating	572,695,113	536,222,973
Lubricating	64,545,951	97,275,403
Residuum	42,700,081	42,014,023
Total	762,381,804	776,523,369

Paraffin is included in lubricating oils, The total increase was 14,141,565 gal., or 1.9 per cent. this year.

Tennessee Coal, Iron and Railroad Company—A call has been issued for a special meeting of stockholders at Tracy City, Tenn., Oct. 16, to vote on the question of increasing the common stock from $30,000,000 to $50,000,000 by the issue of 200,000 shares of new stock. The proceeds of the issue are to be used for improvements and additions to property. It is reported that they will be used for the purchase of the common stock of the Republic Iron and Steel Company. The control of both companies now rests with the same parties, and the two companies have already been placed under what is practically one management.

ALASKA.

Catalla Bay District—A company has been organized to build a railroad 25 miles long from Catalla bay to the coal field on Bering river. H. C. Henry, of Valdez, Alaska, is at the head of the enterprise.

Shushitna Creek—Returning miners report good work for the season of Valdez creek at the head of Shushitna.

ARIZONA.

COCHISE COUNTY.

Superior & Pittsburg—Water is still going down in the shafts; at both Briggs and Junction there is now less water than a week ago, and less than at any time for some years. At the Briggs the flow is down to about 1100 gal. per minute, one-third maximum, and is diminishing fast. In cutting a station on the 1300-ft. level of Cole shaft, a body of good-grade carbonate ore was struck. No exploration of this body has yet been made. Hoatson shaft is going down fast, and is now at 1145 ft., with no trouble from water. The shipment of ore from Cole shaft continues steadily, and will soon be doubled, for the No. 4 furnace at the Calumet and Arizona smelter is shortly to blow in on these ores.

Johnson District—About 250 men are working on development of various properties, near Pearce, and ore is being piled up to await the completion of a branch of the Southern Pacific, that will go in from Dragoon station, and will be ready for traffic in 90 days. This branch may connect through to Bisbee and the Mexican lines of the company. Some eight or nine companies are working in the district, and of these the Peabody, Black Prince and Michigan-Arizona are chief.

Arizpe—At a meeting of this company, in Bisbee, the capital stock was increased from $1,000,000 to $3,000,000, for the purpose of buying additional lands, putting in machinery and improving the property. Some gold has been taken out, and the company thinks it has prospects of more.

Shattuck—On the 800-ft. level the company is opening a sulphide orebody, said to be one of the richest yet found in the mine. New hoist, engine house and office building are under way. Shipments will gradually be increased to 300 tons per day.

Cochise Copper Company—Exploration in Dubacher gulch, up the side of Chihuahua hill, has cut ore. This property is on the north side of Dividend fault, and is in a portion of the district that had not generally been supposed to contain ore. The ore is a black sulphide, averaging better than 10 per cent. copper, and is evidently a good-sized body.

PIMA COUNTY.

Twin Buttes—Under the courageous and efficient management of Ex-Mayor Rose, of Milwaukee, the Twin Buttes mines are rapidly developing into important producers of ore, which is now shipped to El Paso for smelting. This will continue for the present or until the promised smelter is erected at Tucson or near to the mines.

The recent strike of a large body of good sulphide copper ore at a depth of 265 ft. in the Senator Morgan claim has induced the management to place an order for three 100-h.p. boilers, a 100-h.p. double drum hoist, and air compressor of 285 h.p. and the installation of a crude-oil fuel plant. The railway from Tucson to the mines is operated regularly, and also gives easy access to the surrounding mining districts.

CALIFORNIA.

ELDORADO COUNTY.

French Hill—At this mine, Spanish Dry Diggings, John Nation, superintendent, a force of men is putting the mill in order to begin crushing.

Shaw—This mine is being unwatered and the eastern company holding the bond upon it will shortly begin sinking on the ledge.

HUMBOLDT COUNTY.

Howe Creek—In this section Frank Zane and C. G. and W. Taylor have located a body of limestone of considerable extent.

INYO COUNTY.

Black Canyon—In this mine the developments are encouraging, rich ore having been found in the upper tunnel. The ledge is over 7 ft. wide in the face of the workings, the average values being about $16 per ton in gold and silver.

Kaolin—It is reported that E. V. Roby and B. Lea have found an extensive deposit of kaolin in the Funeral range, Death valley.

KERN COUNTY.

Staats—J. A. Bennett has purchased this mine at Piute and will continue the tunnel 300 ft. farther in.

Black Crater—At this place, 50 miles northeast of Johannesberg, De Long, Mann and Snow, prospectors, have found quartz carrying free gold. There is very little water in the vicinity, but the mine is to be developed.

Waukershaw—This mine near Rosamond, owned by Ferrol, Price and Eglow, has been bonded to a Los Angeles company and is being developed by an incline shaft. The low-grade ore is to be cyanided.

NEVADA COUNTY.

Zeibright—This company has bought the hoisting plant of the Orleans mine, which will be used for hoisting ore from new tunnels.

Mammoth—At this quartz claim near North San Juan, C. M. Crane has made arrangements for opening the property. New plans are being made for the plant. The vein is one of the largest in the county.

Richland — Superintendent Ragon expects shortly to reach the gravel channel in this mine at Nevada City. The tunnel is now in 900 ft. and the last 400 ft. have been a very hard rock. The mine is owned by Ohio men.

Lincoln—This mine near Nevada City, owned by J. R. Tyrell and J. T. Hennessy, has been bonded to E. Kast & Co., of San Francisco, who have commenced active operations by starting a new shaft.

SAN BERNARDINO COUNTY.

Resting Springs District—The group of 18 lead mines in this district, near the Inyo county line, owned by the H. L. Drew estate, will probably be developed as soon as the Smith railroad is built. It will come within seven miles of the claims. Los Angeles men are negotiating for a half interest.

Whitewater District—C. J. Baker and P. Niersen have found a ledge carrying free gold in this district.

Orange Blossom Mining Company—For this mine, 14 miles from Bengat station, lumber and machinery are being hauled in. The ore is mainly copper.

Golden Harvest Mining and Milling Company—Work is pushed actively on the mines of this company, six miles from Mannix, on the Salt Lake road. A contract has been let for drilling a well. L. D. Phillips, of San Diego, is president of the company.

Discovery—C. H. Snow has discovered in the Santa Ynez range a ledge of gold-bearing quartz which had been exposed by landslides caused by recent earthquake. The ore is free milling.

SHASTA COUNTY.

Mammoth—It is reported that the net earnings of this company are now at the rate of $1,800,000 to $2,000,000 per annum. Ore has been developed in the mine for upward of five years ahead. A large part of the net earnings of the United States Smelting and Refining Company is derived from this property. The Mammoth smelter is treating a large amount of silicious silver-gold ore from Tonopah, Goldfield and other camps in southwestern Nevada.

COLORADO.

TELLER COUNTY—CRIPPLE CREEK.

Drainage Tunnel—Talk of the early commencement of this tunnel is still being indulged in to a certain extent, but as far as can be learned, nothing has been done in the way of actually commencing work as yet.

El Paso Consolidated—The books of the company have just been closed for the payment of a 1c. dividend, which is the regularly quarterly one, and will amount to $25,000. The operations on the mine are confined to the upper levels, and to a number of lessees on the outside workings. The lower part of the main workings is all under water.

Aileen—A large amount of ore is being shipped from this property, which is being operated under lease by the Colorado State Investment Company. This property is owned by the Morning Glory Leasing Company, which is one of the properties controlled by the Woods Investment Company.

Pharmacist—A fight is being made for the control of this company by the Burns faction and the Rock faction, which is at present in control. Some work is being done on the property by lessees.

Cameron Township—A number of blocks on this townsite were this week sold at trustees' sale to satisfy notes held by the defunct First National Bank of Victor, which suspended operations about three years ago. The property, which comprises the greater portion of the Cameron townsite, was bid in by F. A. Chapman, the receiver for the bank.

Elkton Consolidated—This company will pay a ½c. dividend on Sept. 24. This will make $15,000 to be distributed among the stockholders. The condition of the Elkton is very good at present. A large amount of ore has been taken from the new vein recently opened up.

Telluride Mill—This mill, which was recently purchased by the Golden Cycle and the Findley companies, has been undergoing a remodeling, and will soon be ready for the treatment of ores from both the mines. The mill is situated at Colorado City.

Gold Sovereign—A large new hoist has been installed on this property recently, which increases the capacity considerably. The property is shipping a fair amount of ore. It is situated on Bull hill.

LAKE COUNTY—LEADVILLE.

The output for August amounted to 88,000 tons, the heaviest for several years. The mineral in sight, in the different large producers, is more than the smelters can handle.

Long & Derry—P. W. Breene and associates have a lease on this property and will start work. The property has been idle for a number of years. A new incline will be started farther down the hill and driven into the lower contact, and from this point the property will be explored.

Badger Shaft—Prospecting from the 900-ft. level has started with three drifts in different directions to catch the ore shoots from Iron hill. The shaft was sunk in the fault, but the drifts are now getting into the blue lime.

Best Friend—The rich body of ore recently opened in this property, holds out, and as work proceeds the vein increases in width and value. It is a fissure vein in granite, 6 ft. wide; already 1700 ft. of work has been done on the vein.

J. G. and B. Group—This mine, operated by Buffher and son, is looking remarkably well; at the bottom of one of the shafts a streak of ore 20 in. wide was caught, which runs 5 oz. gold per on; the ore is quartz and similar to that found in the Eagles.

Lord Byron—The ore opened last week in this claim has widened out to 3 ft., carrying 50 oz. silver and 29 per cent. zinc. The ore was found at a depth of 28 ft., and in the lime.

Felicia Grace—Ore is being shipped from the shoot that was opened at 250 ft. It is the intention of the present company to install heavier machinery and pumps, and to resume sinking about Oct. 1, when the shaft will be sent down another 250 ft. to the second contact.

Jennie June—The new company is installing machinery and erecting buildings, and when this is completed, the shaft will be sunk 300 ft. deeper.

Penrose—The management will harness a stream of water flowing from the Bison workings and utilize it in the new underground electric light plant, which is practically completed. A Pelton wheel, sufficient to generate electricity for the entire plant, will be installed at once.

Castle View—Large bodies of ore have been opened up in the Castle View on Carbonate hill, and there is sufficient ore in sight to keep the workings busy for some time to come. A good quality of lead ore was encountered on the 775-ft. level which is being opened by drifts.

winzes and upraises. The daily shipment on this mine is over 150 tons.

La Plata—Fifty tons of oxide ore are being shipped daily from the upper workings of this property which is located in California gulch. Development work is being prosecuted vigorously in the lower zone.

Sugar Loaf—This district is shipping 150 tons daily. This is all high-grade ore, carrying gold. Much development work is being carried on in the district.

Louisville—The rise in the price of zinc has caused the owners of the Louisville to increase the force of men working. Large bodies of this product have been encountered in both the upper and lower workings, and two shots recently made opened up 40 ft. of sulphide ore in the lower contact.

Western Slope—The Binghamton, Rochester and Lincoln lodes on the western slope have been purchased by the Krupp Mining Company, operating on Columbia mountain, near Empire. There has been good ore in sight for some time in these mines, but lack of capital has kept the work behind. Ohio and Wisconsin people are back of the venture.

Little Giant—This mine has become one of the producers of the district, and railroad facilities being inadequate, the Colorado & Southern is putting in a loading trestle on the property.

Kokomo—The old zinc properties are being revived at this place, and everything is activity in the district.

FLORIDA.

POLK COUNTY.

Memminger Phosphate Company—This company's plant, near Mulberry, is approaching completion. The plant is equipped with electric power, and has cylindrical driers. The company owns a large tract of phosphate land.

GEORGIA.

LUMPKIN COUNTY.

Barlow—The shaft-house and tramway at this mine are completed, and ore is being taken to the mill.

Virginia-Tennessee—This is a new company, which has bought several lots near Dahlonega, and will soon begin mining. John W. Whiteside is superintendent.

IDAHO.

BLAINE COUNTY.

Silver Crown—J. F. and J. M. Williams have sold this property to C. C. Ruthrauff and associates. The discovery was made last May, and development work since then has shown a good vein of silver-lead ore, well suited to concentration.

Idaho Democrat—At this mine a good business is being done, concentrating and shipping the old tailings, of which a large quantity remain.

WASHINGTON COUNTY.

George W. Boggs, of Baker City, Oregon, has taken hold of a property on Rapid river, 50 miles from Council. The ore is a good cyaniding ore, and it is claimed that it will run about $12 per ton.

MICHIGAN.

IRON-MENOMINEE RANGE.

Cleveland Cliffs Iron Company—This company has ordered, for its Austin mine at Princeton, an Allis-Chalmers cross-compound, two-stage air compressor, with steam cylinders 20 and 40x48 in. and air cylinder 36 and 22x48 in., together with a lever-driven air pump and a pump to water-jackets on the air cylinders and intercooler. The new compressor will operate at a speed of 74 r.p.m. and is to have a capacity of 4000 cu.ft. of free air per minute. It will run under 150 lb. steam pressure and an air discharge of 75 lb. The inter-cooler will contain 800 sq.ft. of cooling surface. Both inlet and outlet valves on the air cylinder will be of the Corliss type, operated by wrist-plates. In addition to the positive outlet valve, each air-cylinder head will have one steel-cup poppet-discharge valve, which is to serve as a relief valve in case of disarrangement of the main discharge valve. These relief valves also allow the air to leave the cylinder when the receiver pressure falls temporarily from any cause; each is provided with its own port and does not discharge air through the same port as do the main valves.

MONTANA.

BUTTE DISTRICT.

Amalgamated—According to testimony given by John Gillie, superintendent of all Amalgamated mines, before Oliver T. Crane, master in chancery in the hearing by which Fred J. Bliss, aided by the Farmers' Alliance of the Deer Lodge valley, is attempting to secure from the Federal Court an order enjoining the Anaconda and Washoe companies from operating their smelter on the alleged ground that fumes from the plant injure the cattle and vegetation in the valley, this company, during the first six months of this year, carried an average of 8885 persons on its payroll exclusive of those employed in the legal department and officials. Of the ore mined 5 per cent. is first-class, and 95 second; all ore that assays 6 per cent. or better is first-class. The total output of ore in Butte is between 12,000 and 13,000 tons a day, of which 8000 tons are treated in the Washoe plant. The value of the copper produced at the Washoe during the first six months of this year was $17,268,047; silver, $2,501,340; and gold, $467,692; total, $20,237,349. The annual output of copper from the plant is about 160,000,000 lb. In addition, the precipitating plant yields about 2,200,000 lb. The Parrot dump, containing about 300,000 tons of tailings, carries 1 per cent. copper, and should yield, says Mr. Gillie, 6,000,000 lb. It is in process of leaching.

North Butte—Crosscutting for the supposed vein in the Berlin group, 1200 ft. from the Jessie, is in progress from the 1600-ft. level of the Jessie. The company has three veins, one of which, traversing the Edith May and Miners' Union, is from 15 to 30 ft. wide and all first-class ore. Another is the Jessie, 15 to 20 ft. wide, and containing first and second-class, and the other, the Speculator, in which it is estimated that 100,000 tons of good ore is blocked out in a winze 200 ft. deep from the 1600. Old stopes in this mine are full of ore that carries a value of 4 to 6 per cent. copper. It was thrown in as filling by the Speculator company when copper was cheap, and is to be replaced with barren material. The company has not increased its recent production of 1000 or 1100 tons a day, and will not do so until next month.

Reins Copper—This company is drifting east on the south vein at the 1200 and in the footwall of the north vein. In the former there is some commercial ore, but most of the fissure, about 6 ft. wide, is practically barren of mineral. The north vein will be tapped 100 ft. from the point at which it was crosscut from the shaft. The face is in 85 ft. Work is prosecuted in the wall on account of a heavy flow of water in the vein. A crosscut is going north from the 900 to tap the vein opened by a winze on the 800. It is in 25 ft., and must be driven about 50 ft. more.

Butte & London—The shaft has reached a depth of 612 ft. Recently it cut a 10-in. streak of talc carrying a little mineral. The company is about to order a 1000-gal. pump for use on the 800, when that depth is attained. A large air compressor is on the way from the East.

Bulkwhacker—The company is cutting a station at the 400, and will crosscut the vein of silicate of copper struck by lessees in another part of the claim, as soon as the station is finished. This vein is full of 4 per cent. ore above water. It has not been opened below water.

NEVADA.

LINCOLN COUNTY.

Gold Butte—The owners of the control of this mine at Gold Butte, Nevada, have pooled their stock until July 1, 1907. The company is developing its property by means of an adit which is now in about 290 ft. and has already cut a body of ore containing fair mill values. The mine is to be equipped with power drills in the near future. L. A. Copeland, of Salt Lake City, Utah, is president.

NYE COUNTY-JOHNNIE.

Johnnie Consolidated—For $50,000 the unsold lots of the Johnnie Townsite Company passed from the Johnnie Consolidated Gold Mining Company to James R.

Collins, E. K. Foster and A. C. Wagy. The funds thus acquired will be used by the Johnnie Consolidated for the erection of a mill and the completion of the water system. It is the intention to develop several springs and to concentrate the flow. There will be a drop of 100 to 1500 ft. and the force will be used for power by turbines. The mill will be erected on the Johnnie ground, and the old mill building will be used. A 40-h.p. gas engine will be used. Four Nissen stamps are expected within 30 days.

Globe Johnnie—A chute of good milling ore, 3 ft. wide, was unearthed. The vein parallels the main lode and dips toward it. It will be tapped from the main shaft at a depth of 80 feet.

Bullfrog Johnnie—The two-compartment shaft is being sunk on 2 to 3 ft. of ore that will average $40. On the Golden Eagle claim the east and west vein has been prospected and shows a dip of 40 deg. toward the Blue Bell lode, which is 300 ft. to the north. The Blue Bell lode being vertical, it is thought that these two ledges will merge at a depth, and the work is being done with this in view.

Johnnie Consolidated—A raise is driving from the 700 level to tap the ore vein. On the 600 level a crosscut in the orebody proved the vein to be 12 ft. wide, 3 ft. of which runs between $40 and $50.

NYE COUNTY—TONOPAH.

Montana-Tonopah—The annual meeting of this company, held in Salt Lake City, passed off harmoniously and resulted in the election of the following officers: President, Charles E. Knox, of Berkeley, Cal.; vice-president, Charles E. Morris, Pony, Mont.; second vice-president, R. P. Dunlap, of Tonopah; secretary, W. B. Alexander, of Tonopah; general manager, Mark B. Kerr, of Tonopah. During the year 5787 tons of ore were shipped and 10,787 ft. of development work was performed in the mine, making a total of 22,852 ft. in the property. The new equipment ordered less than a year ago has practically all been installed.

WHITE PINE COUNTY.

White Pine Gold Mining Company—A Salt Lake syndicate has acquired this company's property, 22 miles south of Cherry creek, which is equipped with a small mill. The latter is to be overhauled and placed in commission. Mr. O. Wiser, Atlas block, Salt Lake City, Utah, is manager.

Cumberland-Ely—It is reported that copper ore of considerably higher grade than the average of this district has recently been discovered in the Veteran claim, west of the Giroux property, at a depth of about 250 ft. below the tunnel level. This is said to be the reason for the recent rise in the value of the stock of this company. About 51 per cent. of the capital stock is owned by the Guggenheim interests.

OREGON.

BAKER COUNTY.

Blue Boulder—Charles P. Caffrey, of Logansport, Ind., has just purchased from Jacob Thompson this property, consisting of eight claims situated three miles south of Sparta and about 35 miles east of Baker City. The property is well developed, and is probably a copper producer.

Mayflower—President S. R. Balkwell, of the Stampede Mining Company, owner of the Mayflower mine in the Cornucopia district, states that the new cyanide plant has proved a success, as planned by the engineer, George W. Boggs. A contract has just been let to drive a 600-ft. crosscut tunnel on the 800 level into the vein.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh Valley Coal Company—The net earnings of this company for the fiscal year ending June 30, 1906, were $318,480. The total anthracite produced by the company and controlled concerns was 7,667,666 long tons, a decrease of 307,545 tons, or 3.9 per cent., from the previous year. This decrease is due entirely to the enforced suspension of mining during the months of April and May, and to the same cause may also be ascribed the diminished net earnings for the year. During the year the Lehigh Valley Coal Company and affiliated companies produced and purchased 85.25 per cent. of the anthracite coal transported by the Lehigh Valley Railroad Company.

The funded debt of the Lehigh Valley Railroad Company was increased during the year by the issue of $19,000,000 collateral trust bonds, to cover the purchase of the coal mining property known as Coxe Brothers & Company, Incorporated, and the Delaware, Susquehanna & Schuylkill Railroad Company.

Philadelphia & Reading Coal and Iron Company—The report for the year ending June 30, 1906, gives the following figures of coal produced from lands owned and controlled by this company:

	1904-5.	1905-6.	Changes.
Coal mined	11,057,742	10,659,053	D. 398,689
Coal bought	1,184,350	1,024,051	D. 160,299
Total	12,242,092	11,683,104	D. 558,988
Coal sales	10,312,224	10,275,605	D. 36,619

The income account for the year is given as follows:

Earnings	$34,038,540
Expenses	30,877,936
Net earnings	$3,160,604
New work at collieries	$1,131,038
Depletion fund	458,541
Fixed charges and taxes	118,466
Interest	1,583,304
Total charges	$3,291,349
Deficit for the year	$ 130,745

The report says: "The decrease in production resulted from the suspension of mining from April 1 to May 10, 1906, ordered by the United Mine Workers of America. The curtailment of business produced by this suspension of mining caused a loss in the operations of the company of $130,745, after making the depletion of lands fund payment and the payment of 2 per cent. upon the debt to Reading Company. This loss was provided for out of the surplus on hand June 30, 1905.

"The cost of coal mined and purchased during the year was 1.1c. per ton less than for the previous year, and the price realized on all sizes was 14.5c. per ton less, making a total decrease in the net amount realized of 13.4c. per ton compared with the previous year. The total sum charged to the expense for improvements during the year was $1,431,037."

The coal tonnage carried by the Reading Railroad for the year was as follows:

	1904-5.	1905-6.	Changes.
Anthracite	12,029,459	11,856,872	D. 172,587
Bituminous	9,184,421	10,487,698	I. 1,303,177
Total coal	21,213,880	22,344,470	I. 1,130,590

The earnings from coal traffic last year were $17,198,247, an increase of $34,596. The average receipt per ton carried decreased from 80.9c. to 77.0c. This was due to the larger proportion last year of bituminous coal, on which rates are lower than on anthracite.

Girard Mammoth Coal Company—This company has been chartered to mine coal at Raven Run. All the incorporators reside in Shenandoah.

Reliance Coal Company—A suit has been commenced by this company, of Pittston, against the Pennsylvania Coal Company to recover $50,000 damages for coal alleged to have been mined from the plaintiff's land.

G. B. Markle & Co.—This firm has commenced the work of reclaiming Highland No. 1 mine, which was abandoned 20 years ago. The colliery is located near Freeland.

BITUMINOUS COAL.

Somerset Coal Company—This company recently ordered for installation at its Jenner mines, Boswell, Penn., two Allis-Chalmers heavy duty, cross-compound engines for direct connection to 300-kw. alternating-current generators. The new units, which are being furnished by the Allis-Chalmers Company of Milwaukee, will be operated at a speed of 150 r.p.m., condensing, under a steam pressure of 150 lb. They will furnish power for the mine.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Columbus—At a meeting of the stockholders of this company held in Denver, the proposed consolidation of this company with the Hidden Fortune, was ratified. Over 3,000,000 shares of the 5,000,000 outstanding, were represented. A $400,000 bond issue will be authorized, and H. J. Mayham says that he can dispose at once of bonds to the amount of $250,000. The money raised will go the payment of debts and to the financing of

the new company. The capitalization of the Columbus will be increased under the consolidation to $7,000,000 in all.

Homestake—This company has just contracted with the Consolidated Power and Light Company for a complete electrical equipment for both power and lighting purposes at the slime plant being built at Deadwood. The pole line is now being constructed.

Wasp No. 2—On Sept. 10, this company declared a dividend of 1c. a share, and the management hopes to continue these monthly dividends for some time. The company is making a good record on the treatment of low-grade ore, the present average of the ore being about $2.25. The ore is mined from an open cut, drawn to the surface by mules, and treated in a dry cyanide mill.

Globe—At the annual meeting of this company, held in Chicago, it was decided to recommence work at the mine and to complete the 100-ton mill which is in process of erection. The building is completed and some of the machinery is already on hand. The Ogden process will be installed. The following officers were elected: President, E. J. Adams, Peoria, Ill.; vice-president, Peter B. Nelson, Racine, Wis.; secretary, Samuel Weller, Chicago; general manager, Frank Ickes, Deadwood.

TEXAS.

DALLAS COUNTY.

Texas Fullers' Earth Company—This company has been organized to develop a deposit of fullers' earth and to prepare the material for market. T. L. Bradford, Dallas, Texas, is president.

UTAH.

BEAVER COUNTY.

Cedar Mining Company—A second vein of lead carbonates carrying values in silver has been opened in the property of this corporation.

Estella—This company is operating a small mill near Milford and is running through ore of the value of about $7 a ton.

Lulu—This company has opened up a body of ore on the 400-ft. level, which is supposed to be an extension of the Horn silver vein.

SUMMIT COUNTY.

Uintah Treasure Hill—Recent developments in this property indicate that it will soon be in condition to yield ore for shipment.

JUAB COUNTY.

Tintic Ore Shipments—During the past week shipments amounted to 108 carloads, the contributing mines and amounts being: Ajax, 3; Beck Tunnel, 5; Bullion Beck, 5; Carisa, 5; Centennial Eureka, 25; Dragon Iron, 3; Eagle & Blue Bell, 6; Eureka Hill, 13; Gemini, 11; Godiva, 2; Grand Central, 3; May Day, 2; Mammoth, 4; Scranton, 4; South Swansea, Star, Swansea and Yankee 1 each; Uncle Sam 5; Yankee Consolidated 5; other mines, 3 cars.

TOOELE COUNTY.

Overland Gold Mining Company—This corporation has abandoned its property near Sunshine. The property contains some large bodies of low-grade ore but as depth was attained it became less susceptible to treatment, although the values held up about as well. The mine is equipped with a cyanide mill prepared to handle about 150 tons daily. The property is controlled by Boston parties and has been a paying proposition only at intervals.

New Stockton—Developments on the 1000-ft. level still continue encouraging. A large body of ore, containing considerable shipping stuff, has been opened.

WEST VIRGINIA.

The commission appointed by the governor to revise the mining law has been in session at Charleston. The members of the commission are:

State mine inspection bureau: James W. Paul, of Charleston; Earl Henry, of Clifton, deputy inspector.

Miners: W. H. Blon, of Wheeling; Bruce Morris, of Monongah; J. H. Nugent, of Charleston; E. E. Leslie, of Caperton; H. L. Price, of Coopers.

Operators: J. Brooks, of Clarksburg; E. L. Purdy, of Thomas; D. C. Kennedy, of Charleston; W. M. Gille, of Boomer; J. S. Cunningham, of Berwind.

The commission will make a thorough revision of the State law, and will present its recommendations to the legislature at the next session of that body.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA—CARIBOO DISTRICT.

This district was recently visited by J. A. Macdonald, leader of the Opposition in the Provincial Legislature, a lengthy interview with whom has been published in the Rossland *Miner*. Summarized, his conclusions at the close of a three weeks' trip are: Ordinary placer mining in Cariboo is largely a thing of the past, but with hydraulicking and deep drift mining on the large scale undertaken by a number of partnerships and companies, there is ample reason to expect that the district will again become as great a gold-producer as in its most productive days when individual miners recovered much gold. The class of mining now being done involves a preliminary expenditure of large sums of money. The outlay on the Cariboo Hydraulic property, owned by the Guggenheims, had been large for years before they acquired it, and considerable further expenditure is being made to bring in a vast quantity of water for hydraulicking purposes. Other properties have also had much money spent on them to make them productive. The chief need of the district today is a railway, the freighting of machinery and supplies from the Canadian Pacific railway at Ashcroft to Bullion, 200 miles, or Barkerville, 280 miles, almost doubling costs. At present there is a great scarcity of labor all through the district. Amendments to the placer mining laws and regulations are required, new conditions making amendments absolutely essential, to encourage investment of needed capital.

BRITISH COLUMBIA—SLOCAN DISTRICT.

American Boy—This mine, which has been closed down since the accidental death last spring of the late Thos. McGuigan, who had managed it for years, is to be operated again, W. E. Zwicky, of Kaslo, manager of the Rambler-Cariboo mine, having taken charge of the American Boy as well. The mine is owned by the American Boy Mining Company, of Spokane, Wash., reorganized some months ago with its stock on an assessable basis. Assessments since made have brought in sufficient money to do necessary development work. During several years shipments of silver-lead ore of good grade were made from this mine.

Idaho-Alamo—A new strike of about a foot of clean ore running high in silver and lead values has been made in the Alamo mine of the Idaho-Alamo Consolidated Mines, Ltd., an English company under which were consolidated the old Alamo and Idaho mines, formerly among the largest producers in the Slocan district. The provincial mineralogist, after having visited the property some time since, reported that the Alamo had been developed for a vertical depth of 288 ft., by four levels driven from 1000 to 1200 ft. and systematically laid out with raises, etc. Above these levels the known ore had been extracted, but there was good ore in the floor of the bottom level and in a winze. The vein was from 3 to 8 ft. wide. The last shipment made was in 1898, when the output was about 400 tons of ore running 180 oz. silver per ton and 40 per cent. lead.

BRITISH COLUMBIA—VANCOUVER ISLAND.

Tyee Copper Company—This company reports that in August its smelter at Duncans Station ran 14 days and treated 2038 tons of Tyee ore, giving a return, after deduction of freight and refining charges, of $39,203; an average of $19.24 per ton.

ONTARIO.

Regulations for the medical supervision of mining and lumber camps have been issued by the Provincial Government of Ontario. The camps must be inspected once a month by a medical practitioner, and the owners of mining camps in unorganized districts must contract for medical attendance.

Columbus Mine—A complete steam power plant is being installed at the Co-

lumbus mine, at Cobalt, where a cross vein was discovered at 52 ft., increasing in richness until the 60-ft. level was reached.

St. Anthony's Reef—The Jack Lake Gold Mining Company, operating this mine in the Sturgeon Lake district, has produced $7000 in gold bullion as the result of two weeks run of the stamp mill.

Delora Development Company—Prospecting work is going actively forward at the location of this company in the Manitou region, under the supervision of Director John E. Burns. Ore from the five veins on the property panned freely with visible gold in some instances. A shaft is being sunk for further tests. D. W. Bliss, of Toledo, president of the company, with a party of American stockholders, recently visited the property.

Ore Discovery—A report of the finding of gold in Playfair township, north of the Height of Land and about 86 miles north of Cobalt, has been confirmed by Cecil B. Smith, chairman of the Timiskaming & Northern Ontario Railway Commission. The finder is a prospector from Kentucky, and the samples obtained on being assayed showed an average of about 411 oz. gold and 400 oz. silver to the ton.

Port Arthur—While blasting a trench for water supply on Banning street, Port Arthur, Alex Macfarlane struck a vein of quartz carrying native silver and sulphide of copper. The locality had formerly been prospected, but no workable deposits found.

NOVA SCOTIA.

A new coal merger is in course of development in Cape Breton, embracing the North Atlantic and the Blockhouse collieries, the areas at False Bay beach, owned by Gen. Montgomery Moore, the properties of the Cape Breton Coal, Iron and Railway Company, and the Cumberland Railway and Coal Company's Cape Breton areas. Graham Fraser is understood to be managing the deal.

MEXICO.

DURANGO.

Inde District—By the persistent claims of Wm. Benton, of this place as to the merits of the district in general and his Guadalupe property in particular, this section is receiving attention. Benton's property, the Guadalupe, in which he had developed a body of a peculiarly porous white and yellow quartz running from 8 to 15 grams in gold, has been sold to a London syndicate for £40,000 in cash. A 100-ton cyanide plant is being erected, and an electric plant will be placed on the river about two miles distant, whence power will be sent and water pumped to the mill.

Inde Gold Mining Company—This company, organized by C. J. Stone and R. N. Dickmann, with T. H. Watkins, of New York as president, has bought the Terrible adjoining the Guadalupe, for $187,000 gold. In four months of development work it has opened up in the lime cave after cave, from which, of some 1500 assays taken, over 900 averaged an ounce in gold.

AFRICA.

RHODESIA.

The gold output for August is reported at 50,127 oz. bullion, which is 1642 oz. more than in July, and 14,061 oz. more than August, 1905. For the eight months ending Aug. 31, the total was 269,446 oz. bullion in 1905, and 363,078 oz. in 1906; an increase of 93,632 oz. The bullion reported this year was equal to 323,139 oz. fine gold, or $6,679,283. Other production reported for the eight months this year includes 67,085 oz. silver; 417 tons lead; 17 tons copper; 11 tons wolframite; and 73,841 tons coal. The wolframite is the first ever mined in Rhodesia.

ASIA.

INDIA—MYSORE.

Kolar Goldfield—The output in August was 46,817 oz. bullion, being 430 oz. less than in July, and 4941 oz. less than in August, 1905. For the eight months ending Aug. 31 the total was 417,269 oz. bullion in 1905, and 389,020 oz. in 1906; a decrease of 31,249 oz. The bullion reported this year was equal to 375,542 oz. fine gold, or $7,181,130 in value.

AUSTRALIA.

WESTERN AUSTRALIA.

Kalgoorlie—The main shaft of the Great Boulder Proprietary is now down to 2000 ft. Recent discoveries at the 1900-ft. level have been satisfactory. The two main orebodies in the Kalgurli are furnishing payable telluride ore, that on the eastern side of the main shaft being about 50 ft. wide.

Boreholes in the Ivanhoe South Extended have cut two small orebodies 2 ft. and 3 ft. wide, carrying fair values, at depths of 965 and 1200 ft. In the Ivanhoe the east lode has been proved at the 865-ft. level for the full length of the property —a payable run of ore for a continuous length of 1444 ft. and showing good values both north and south. At the 1373-ft. level a solid body of ore is showing in both faces of the drive.

Mount Malcolm—The North Star mine, which yielded 23,000 oz. gold from about 23,000 tons crushed by the old company, is now owned by a local syndicate and is being reopened. The Sons of Gwalia is much improved. The fourteenth level is now in progress to cut orebodies already located by the diamond drill.

Laverton—The Lancefield will soon be in full operation once more. The Craigiemore July returns showed marked improvement, 2100 tons being treated for 621 oz. gold. As costs were a shade under 16s. 6d. per ton, this shows a profit for the month.

CENTRAL AMERICA.

COSTA RICA.

Gold Production—The two producers are the Abangarez Gold Fields of Costa Rica, with a 40-stamp mill, and the Costa Rica Esperanza Gold Mining Company with 10 stamps; R. A. Crespi is manager of both. In the three months, June to August, the former treated 7673 tons and recovered $153,114, or $19.95 per ton; the latter milled 1786 tons for a yield of $41,552, or $23.27 per ton; total production, $194,666. The above companies control about 40 square miles of mineral lands and concessions on the Pacific coast of Costa Rica and have expended on their properties over $1,500,000 in development and equipment; their plants consist of a complete milling, concentrating, cyanide, tube-mill and filter-press plant operated by hydro-electric power during the rainy season, and by steam power during the dry season.

Coal Trade Review.

NEW YORK, Sept. 26.

Car shortage and scarcity of labor are the general complaints in the West. There is always some trouble with the railroads in the fall, but this year it has begun earlier than usual. The rush of coal to the Lake trade is on now, and this helps to embarrass mines serving local and city trade. Need for more labor is shared by coal operators with many other branches of trade, all over the country.

The Eastern trade shows no special change. Both anthracite and bituminous trades are quiet. The coastwise business is improving, as the cold weather approaches.

COAL TRAFFIC NOTES.

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Sept. 15 were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	3,252,812	3,044,572	D. 208,240
Bituminous	20,334,421	22,216,325	I. 1,881,904
Coke	7,720,554	8,860,122	I. 1,139,568
Total	31,307,787	34,121,019	I. 2,813,232

The coal tonnage of the Baltimore & Ohio Railroad for the seven months ending July 31 is reported as follows:

	1905.	1906.	Changes.
Anthracite	602,398	501,812	D. 100,586
Bituminous	12,556,797	14,489,781	I. 1,932,984
Coke	2,593,171	3,357,871	I. 764,700
Total	15,752,366	18,349,464	I. 2,597,098

This shows a total increase of 16.5 per cent. this year.

Coal shipments over the Norfolk & Western Railroad for the seven months ending July 31 were, in short tons:

	Coal.	Coke.	Total.
Line points	4,736,753	1,218,480	5,955,233
Tidewater	1,983,585	101,322	2,084,907
Total	6,720,338	1,319,802	8,040,140
Total, 1905	5,815,966	1,411,328	7,227,294

Of the total traffic this year 74.1 per

cent. went to points on the line, and 25.9 per cent. to tidewater.

Coal tonnage originating on the lines in the Ohio Coal Traffic Association is reported as below for the seven months ending July 31, in short tons:

	1905.	1906.
Hocking Valley	1,831,254	2,099,049
Toledo & Ohio Central	786,067	878,064
Baltimore & Ohio	1,148,478	930,251
Wheeling & Lake Erie	1,437,673	1,114,216
Cleveland, Lorain & Wheeling	1,136,623	1,096,757
Zanesville & Western	426,216	591,257
Toledo Division, Penna. Co.	1,014,912	1,297,639
Lake Erie, Alliance & Wh'ling.	404,999	333,875
Marietta, Col. & Cleve	.....	4,505
Total, net tons	8,186,222	8,345,611

The total shows an increase of 159,389 tons, or 1.9 per cent., notwithstanding the strike this year.

Shipments of coal by water from the chief Atlantic ports are given by the Bureau of Statistics as below, for the seven months ending July 31:

	Anthracite.	Bituminous.	Total.
New York	7,912,557	5,615,197	13,527,754
Philadelphia	1,011,866	2,110,789	3,122,655
Baltimore	124,029	1,852,190	1,976,219
Newport News	.....	1,726,684	1,726,684
Norfolk	.....	1,369,768	1,369,768
Total	9,048,452	12,674,628	21,723,080
Total, 1905	10,060,930	11,475,407	21,536,337

New York includes all the New York harbor shipping points. The coal bunkered, or furnished to steamships as fuel, in the seven months of this year was 1,637,783 tons.

Shipments and receipts of coal at all Lake ports, for the year to July 31, are given by the Bureau of Statistics as below, in net tons:

	1905.	1906.	Changes.
Shipments	6,753,704	7,598,740	I 845,036
Receipts	5,734,486	6,420,315	I. 685,829

The excess of shipments over receipts is accounted for by coal shipped to Canadian ports; and by coal taken by steamships for their use.

Receipts of coal and coke at Chicago, with shipments from that city to tributary markets, are reported by the Chicago Bureau of Coal Statistics as below, for the seven months ending July 31:

	Received.	Shipped.	Balance.
Anthracite	663,940	334,146	329,794
Bituminous	5,961,966	1,542,902	4,419,064
Coke	225,932	163,945	61,987
Total	6,851,838	2,040,993	4,810,845
Total, 1905	5,960,768	1,676,450	4,284,318

The balance represents approximate consumption in Chicago. The bituminous receipts this year were made up as follows: Pennsylvania, 497,709 tons; Ohio, 502,902; West Virginia, 541,239; Indiana, 1,637,816; Illinois, 2,782,300; total, 5,961,966 tons.

Coal receipts at St. Louis, as reported by the St. Louis Coal Traffic Association, for the seven months ending July 31 were 3,102,933 tons in 1905, and 4,107,769 tons in 1906; an increase of 1,004,836 tons this year.

Shipments of Broad Top coal over the Huntingdon & Broad Top railroad for the week ending Sept. 22 were 15,151 tons; for the year to Sept. 22, the total was 552,348 tons.

New York. Sept. 26.

ANTHRACITE.

The hard-coal market in the East does not yet show any signs of returning animation. Since nothing is to be gained by buying coal now rather than later, except possibly a cheaper and more regular transportation, not much activity is expected until cold weather. It is believed that the large dealers in New York are stocked up to their capacity, which, however, with few exceptions, is not very large. The mines are working uninterruptedly, but their output goes mainly to the West, where it is stocked for winter consumption.

Prices remain at $4.75 for broken and $5 for egg, stove and chestnut; for steam sizes, $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; $1.30@1.35 for barley; all f.o.b. New York harbor shipping points.

BITUMINOUS.

There is practically no change in the Atlantic seaboard soft-coal trade. Orders on old contracts appear to be plentiful, but new business is scarce. Prices remain steady at $2.50@2.60, for good grades of steam coal, down to $2.30 for lower grades, f.o.b. New York harbor shipping points. There is some inquiry for export, but it does not amount to much.

Trade in the far East shows a little business, probably to take advantage of the prevailing low ocean freights, and shoal-water ports are practically through with their business. Trade along the Sound is quiet, with here and there an irregular order. Business in New York harbor is all on old contracts, with no inquiry for new business. It is difficult to get rid of any coal on the market, however small in quantity.

All-rail trade is dull and prices at the mines are lower. Car supply is generally short, though not acutely so on any road except the Baltimore & Ohio, on which road embargoes are interfering with its patrons, so that they are unable to calculate ahead.

Vessels in the coastwise market are in fair supply and rates are steady. Vessels are inclined to offer inducements, such as additional days for loading and discharging, above the usual charter requirements. Current rates from Philadelphia are quoted as follows: To Boston, Salem and Portland, 65@70c.; to Providence, New Bedford and the Sound, 55c.; to Lynn and Newburyport, 80@85c.; to Portsmouth and Bath, 70@75c.; to Saco, 90c.; and to Gardiner, 85@90c. and towages.

Birmingham. Sept. 24.

A little shortage of railroad cars is reported in the coalfields of Alabama. The labor situation is somewhat better than it has been, and the union miners are returning to the mines in various parts of the district. Some railroad men have been quoted in this section as saying they expect a more obstinate shortage of railroad cars this winter than ever before. There are more mines, and while the railroads have been buying cars for several years, the coal production has been increasing more rapidly.

The coke production is far from being satisfactory. The shortage in this line is felt, several furnaces scrapping around for supplies. Several hundred coke ovens are under construction now, and it is reported that several hundred more will be constructed by next spring in this state.

Chicago. Sept. 24.

The wholesale coal market continues dull, though improving slightly from week to week. Demands of consumers are not yet notably increased by weather conditions, and the only relief from over-supply of western bituminous is the lack of cars, which is preventing the demoralization of the market that in the past has followed the accumulation of demurrage coal. Eastern coals are reported actually scarce, due to the scanty car supply.

Fine coals are low-priced and abundant; prepared sizes are coming more into demand, though slowly. Illinois and Indiana lump and egg bring $1.90@2.30; run-of-mine $1.65@1.90 and screenings $1@1.50. Eastern coals hold up firmly to circular quotations, owing to a steady and, for some products, an increasing demand, joined with a short car supply. Hocking is selling at $2.95 for run-of-mine and $3.30 for lump; smokeless brings $3.40 for run-of-mine and $4.05 for lump and egg, for Pocahontas and New River, with cheaper grades 15@25c. under these quotations. Youghiogheny is in good demand and scant supply, bringing $3.10. All-rail trade in bituminous is increasing, though not yet heavy; dock supplies are not yet drawn upon to any extent.

Cleveland. Sept. 25.

The coal situation resolves itself mainly into a question of cars. With lake shipping mines getting 50 per cent., and with other mines getting one-third of their requirements, the market is exceptionally strong, largely due to short supply.

There has been more or less fear that the movement of coal is going to fall short on the lakes this year. This is due largely to the action of shippers. Many of them have bid at times for vessel tonnage promiscuously, but soon satisfied their needs. The result has been that the lake movement has, from time to time, been congested in different directions, there being no even distribution. At present the prospects are for easier movement for the remainder of the year.

The lack of proper distribution of cars and the shortage of supply has resulted in a tightening of the market, which puts mine-run steam coal to $1@1.05 at the mines. Slack is easier, selling at 65c. at the mines.

The coke market has eased. Prices have declined slightly during the week and are

now $3.75 at the oven for the best grades of 72-hour foundry coke for prompt shipment, and on first-half contracts. Furnace coke is quoted at $3 at the oven.

Pittsburg. Sept. 25.

Coal—The railroad car shortage is more serious than at any time this year and a movement is on foot to bring about better conditions. Some coal operators this week received only 20 per cent. of their requirements of cars. It is proposed to interest the Chamber of Commerce and the Manufacturers' and Merchants' Association. These bodies are expected to appoint committees to act with the congressmen and committees of coal operators and manufacturers to visit President A. J. Cassatt of the Pennsylvania Railroad Company and urge him to give some relief to Pittsburg district shippers. The trouble is due to a certain extent to the lack of adequate motive power, as cars that have been sent from the mines to Cleveland have not reached their destination in over a week. The Pittsburg Coal Company is operating about 50 per cent. of its mines, but smaller concerns that do not own individual cars are not running to more than 20 per cent. of their capacity. Prices are higher this week and mine-run coal is quoted at $1.15@1.25 a ton at the mine. Sales for prompt shipment have been made at $1.35 a ton.

Connellsville Coke—Furnace coke is firm at $2.85@3 and foundry is quoted at $3.35@3.60. There was but little change in production and shipments. The *Courier* gives the production for the week at 278,227 tons and the shipments at 14,470 cars distributed as follows: To Pittsburg 4650 cars, to points west of Pittsburg, 7920 cars, to points east of Connellsville, 1900 cars. The production in the Lower Connellsville region amounted to 109,510 tons.

Foreign Coal Trade.

Sept. 26.

Coal production in France for the six months ending June 30 was 17,695,419 metric tons in 1905, and 15,757,349 tons in 1906; a decrease of 1,938,070 tons, or 10.9 per cent. This decrease was due chiefly to the Courrières accident and the strikes which followed it.

Exports of fuel from Great Britain, with coal sent abroad for the use of steamers engaged in foreign trade, were as follows for the eight months ending Aug. 31, in long tons:

	1905.	1906.	Changes.
Coal	31,180,138	36,569,442	I. 5,389,304
Coke	443,148	499,471	I. 56,323
Briquets	748,165	960,449	I. 212,284
Total exports	32 371,451	38,029,362	I. 5,657,911
Steamer coal	11,453,959	12,304,086	I. 850,127
Total	43 825,410	50,333,448	I. 6,508,038

This shows a total increase of 14.8 per cent. in coal sent beyond the limits of the United Kingdom. Exports to the United States, included above, were:

To:	1905.	1906.	Changes.
Atlantic ports	37,110	21,531	D. 15,579
Pacific ports	72,415	28,002	D. 44,413
Total	109,525	49,533	D. 59 992

The important exports were to: France, 6,137,951 tons; Italy, 5,442,886; Germany, 4,928,019; Sweden, 2,315,534; Russia, 1,965,849; Spain, 1,807,625; Egypt, 1,669,979; Denmark, 1,600,293; Argentine Republic, 1,580,846 tons.

Iron Trade Review.

New York, Sept. 26.

The rush to buy pig iron is over, most consumers being supplied for some time to come. Those who need small supplies now have to pay high prices for what they get.

The present scarcity is in steel billets and sheet-bars. Mills which depend on buying crude steel are in some difficulty about their supplies.

In finished material, there is a new demand for plates and shapes, resulting from heavy orders for steel cars placed by the railroads. Bridge material is also in demand, making the structural market active, though there is not so much call for building material.

Lake ore shipments are still a little below expectation. While no action has been taken toward fixing ore rates for next season, recent sales indicate that prices will be higher by at least 50c. a ton, and probably more.

Birmingham. Sept. 24.

Southern pig-iron manufacturers are selling iron right along for delivery next year, during the first six months, while what little spot iron there is to be had in this section is being gobbled up quick at fancy prices. The production is about holding its own. The raw material supply, especially ore and coke, is still a little slow. Iron selling for delivery during the first six months of the coming year is bringing between $15 and $16 per ton. In some quarters the statement is made that consumers, fearing that their needs for iron will not be met on time, are offering $15.75 and $16 per ton, the stipulation being that the product is to be delivered right on time. Spot iron, but only a small amount of it to be had, is bringing $17 per ton. Special brand and charcoal iron bring strong prices, $22 per ton still being quoted for the last mentioned product.

Efforts are now being made to increase the production of raw material, and it is believed that all demands during the winter will be met.

Directors in the Sloss-Sheffield Steel and Iron Company are in the Birmingham district, inspecting properties of that company.

Rumors prevail that the Southern Steel Company will absorb other smaller concerns in the Birmingham district, the Georgia & Alabama Iron Company being one of those mentioned. There is no verification of these reports.

Chicago. Sept. 24.

There has been a quiet but steady market for pig iron and iron products in the last week. If there has been no rapid booming of the business there has been no falling behind, and the tone of both sellers and buyers of iron is optimistic for continued strength of the market. Melters, with rare exceptions, have contracted for enough iron to last them throughout the next six months—the last three months of 1906 and the first three months of 1907. That being the case, we may look for little in the way of future contracts, until the year 1907 has set in. For earlier deliveries there is now a fairly good demand with premiums of 50c.@$1. Some such contracts are being made, but they are not typical of the trade; they represent mainly immediate needs, due to more business than melters expected.

Present quotations are $20@20.50 for No. 2 Northern, and $15.50@16 Birmingham for Southern No. 2—$19.40@19.90 Chicago. Lake Superior charcoal iron is firm at $20@21. These figures are for delivery on contracts for the first and second quarters of next year. Most contracts now being made are for the second quarter.

Cleveland. Sept. 25.

Iron Ore—The movement of iron ore on the lakes is still fairly heavy and bids fair to show an increase for this month over a year ago. No sales have been made for 1907 delivery, but regular customers of ore shippers have been given assurance their needs will be taken care of. Less constant consumers have been given no assurance and will only be supplied provided there is an excess. Rates of transportation on the lakes are unchanged.

Pig Iron—Stiff buying of basic and bessemer iron during the week has advanced prices. Basic is now being sold in 1000-ton lots for second-quarter delivery next year at $18.75 in the Valleys while bessemer is sold at $19 in the Valleys. There is little or no iron for immediate shipment. Foundry is not being sold for first quarter to any extent, most furnaces demanding contracts running through the first half, on which $18.50 in the Valleys is quoted. Spot iron is sold at $20. Southern No. 2 is quoted at $15.50 for first-half delivery, with spot iron selling at $17 Birmingham.

Finished Material—Billets and sheet-bars are exceedingly scarce, especially forging billets. They are sold at $35 Pittsburg. The shortage of sheet-bars is strengthening the sheet market, but prices have not changed, especially out of stock. Bar iron is scarce and higher, due principally to the labor situation and the price of scrap. Most sales are made at 1.70c. Pittsburg. Plates are firm, with deliveries

prompt. Shapes are getting a little stronger and some sales from Eastern mills are made at $2 premium.

New York. Sept. 26.

Pig Iron—The market is strong, and there is a good deal of buying for next year. Prices are a little uncertain, especially where early deliveries are wanted Only those buyers who are in urgent need, however, are asking for iron for the fourth quarter.

Current quotations for pig iron are for New York or parallel delivery:

Northern:	
No. 1 X foundry	$20.50@21
No. 2 X foundry	20@20.50
No. 2 plain	19.25@20
Forge pig	17.50@18
Southern:	
No. 1 foundry	20.25@20.75
No. 2 foundry	19.75@20.25
No. 3 foundry	19@19.50
No. 4 foundry	18.25@19
No. 1 soft	20.25@20.75
No. 2 soft	19.75@20.25
Gray forge	17.25@18
Basic pig:	
Northern	18.75@19.25
Virginia	18.60@19.10
Alabama	

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Cast-Iron Pipe—Some large orders are pending, including several for 1907 delivery. About $32 per net ton for 6-in. pipe at tidewater is the lowest quotation.

Bars—Bars are in demand at 1.695c. tidewater for common iron, and 1.745c. for refined. Steel bars are quoted at 1.645@1.745, according to size and conditions of orders. Store trade is steady at 2.50c. delivered. The bar-iron pool met last week and decided to make no change in prices. For tidewater trade, however, premiums are asked on many orders.

Structural Material—Demand is less pressing, though there are still many new building projects in hand and under discussion. Bridge work is bringing most orders just now.

Rails—Standard rails are unchanged at $28, and contracts are being taken only for next year. Light rails are in good demand.

Old Material—Dealers and consumers hold different views, and there is more discussion than actual selling. There is rather a wide range of prices. No. 1 railroad wrought is $19@19.50; No. 1 yard wrought, $17@18; machinery cast $16@16.50; heavy steel melting scrap, $16@16.50 per ton.

Philadelphia. Sept. 26.

Pig Iron—The pig-iron situation has quieted down materially and while there is more or less business being done, especially in basic and bessemer, the volume of transactions is rather light and is made up of small lots mostly. There has been no change in prices since last week, excepting in a few ascertained transactions where certain kinds of iron were necessary. Some business has been done with Southern furnaces and negotiations are pending today for additional supplies from that quarter. Basic iron is particularly active as measured by inquiry, but the actual sales have been moderate. The mills are melting up a great deal of forge iron and there has been something like a revival of demand for ordinary forge. Quotations may be fairly given at $22 for No. 1 X foundry; $21 for No. 2 X; $20 for No. 2 plain; $18 for gray forge; $17.50 for ordinary; $19 for basic and $21.25 for malleable. Spot lot quotations are a little above these figures.

Steel Billets—Steel billets are wanted a great deal more than the supply will permit. The ordinary run of steel is quoted at $32.50 and forging billets are from $4 to $6 per ton higher.

Bars—Reports from our mill people are of a very encouraging nature but unfortunately full production is not realized; in one or two localities special steel bars are selling at 1.88½.

Sheets—The sheet mills are booking more business almost daily. It is said that an advance in sheets is likely to be made, but the mill owners are getting more money through the premium method.

Pipes and Tubes—The volume of business has declined a little simply because the users of tubes have made themselves safe by contracts, which keep them out of the market.

Plate—The rush of orders in car building has precipitated a number of inquiries for plates at the Pennsylvania mills and some of the largest orders for the year will shortly be placed. The small buyers continue to be heard from, particularly for boiler plate, and the quotations are above 1.88½ which is the quoted figure.

Structural Material—The rush of orders for structural material keeps up. The nominal quotations are 1.83½@2c., but more money is frequently paid.

Scrap—There has been for some time past a greater demand for railroad scrap than could be furnished, and a good many dealers are unable to obtain any. Mill scrap has advanced in price about 50c. and will probably go 50c. higher. No. 1 yard scrap is wanted today at $20 and parties will have to take it at that price or go without. Old iron rails are nominally $25. No. 1 steel scrap is quoted at $18@18.50 per ton.

Pittsburg. Sept. 25.

There have been no transactions of any importance in the iron and steel markets during the week, outside of some sales of bessemer pig iron at $19, Valley furnaces, the highest price of the year. In finished lines all the mills have orders that will keep them in steady operation through the first quarter, and there is no record of dullness in any line. New business in structural material is light, and as a result, deliveries have improved. Specifications on steel bars and plates are very heavy, and mills are still behind. Orders for three additional Lake freighters have been placed; two of them are for delivery in 1908, and the order for plates will go to the Carnegie Steel Company, which will divide them with the Illinois Steel Company. Plate business for next year will be still further increased, as the Pennsylvania railroad has placed orders for 12,400 cars, deliveries to begin April 1, 1907. The order is divided, the largest portion going to the Pressed Steel Car Company. The Cambria Steel Company and the Standard Steel Car Company will furnish nearly one-half of the order. The Pennsylvania contracted for 36,000 cars for 1906 delivery, and it is likely the order for next year will be increased later. The new orders for cars and boats will require fully 200,000 tons of plates. All efforts to advance prices in any of the finished lines are being vigorously opposed by the leading producers, the United States Steel Corporation and the Jones & Laughlin Steel Company. On steel bars these concerns adhere to the old price of 1.50c., while the Cambria, Republic and Crucible Steel companies quote 1.60c. Specifications on old contracts, however, are so heavy that it is impossible for mills to take on any new business for early shipment without slighting customers who are urging delivery. Iron bars are stronger and prices are higher, common bars being quoted at 1.65@1.70c. Pittsburg.

The sheet and tin-plate mills are being operated as fully as the supply of steel will permit. It was learned today that the American Sheet and Tin Plate Company has orders on its books that will keep all of its mills now running in operation until April 1. The company has arranged for an additional supply of steel, and the Morewood tin-plate works at Gas City are scheduled to resume operations next Monday. It is understood that while no official action has been taken, the price for sheet and tin-plate bars for the fourth quarter will be established at $30, the rate fixed for September.

The Carnegie Steel Company has just begun work on a billet mill at the Donora works. At present blooms are being shipped from this plant, and it is intended to roll them down to 4x4 billets.

Pig Iron—Two sales of 1000 tons each of bessemer pig iron were made this week at $19 for delivery this year, and into the first quarter. Some small lots for prompt shipment also were made at this price. It is announced that $19, Valley furnaces, will be the minimum price for bessemer iron for the first half of next year. The leading independent producer is said to be the only interest that will be able to furnish bessemer for delivery this side of July 1, 1906. The same interest is quoting basic iron at $18.75, Valley, for next year. Foundry iron is firm at $20, Valley, for prompt shipment and $18@18.25, Valley, for next year is quoted. Several thousand tons have been sold at these prices. Gray forge

does not seem to be in demand. A few small lots were sold during the week at $18.10@18.35, Pittsburg.

Steel—While the supply of both bessemer and open-hearth billets has improved, the demand has increased in proportion, and conditions are about the same. Bessemer billets are quoted at $28@29, and open-hearth $29@30. Plates are firm at 1.60c., and merchant steel bars at 1.50@1.60c.

Sheets—There is no change in the sheet market, and present prices are likely to be continued the rest of the year. Black sheets remain at 2.50c., and galvanized at 3.55c. for No. 28 gage.

Ferro-Manganese—Foreign 80 per cent. is quoted at $87.50@88 for prompt shipment, and $83@85 for delivery in the fourth quarter. While sales for future delivery have been made at these prices, it is believed the rate will be much higher later in the year.

Cartagena, Spain. Sept. 8.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report shipments for the week one cargo, 5400 tons Calasparra magnetic ore, to Rotterdam; two cargoes, 5150 tons dry ore, to Great Britain. The market continues firm, and freight rates high.

Prices are 8s. 10d.@9s. 1d. per ton for ordinary 50 per cent. ore; 9s. 4d.@9s. 7d. for special low phosphorus; 10s. 9d. for S. P. Campanil; 12s. 1d. for specular ore, 58 per cent. Manganiferous ores range from 12s. 9d. for 35 per cent. iron and 12 manganese, up to 15s. for 25 per cent. iron and 17 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, is quoted at 10s. 8d. per ton.

London. Sept. 14.

Open-hearth Steel Production—The British Iron Trade Association reports the total make of open-hearth steel in Great Britain as below, for the half-year ended June 30, comparisons being made with the first half of 1905; the figures are in long tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct
Acid	1,627,698	82.2	1,638,667	74.6
Basic	352,397	17.8	558,186	25.4
Total	1,980,095	100.0	2,196,853	100.0

The increase in acid steel was only 10,969 tons, or 0.7 per cent., while that in basic steel was 205,789 tons, or 58.2 per cent.; the total gain being 216,758 tons, or 9.9 per cent. This is a remarkable advance for the basic process.

Tne number of open-hearth furnaces in use during the half-year was 375, showing an average make of 5858 tons per furnace.

The chief finished products of open-hearth steel for the half-year were: Plates and angles, 942,751 tons; bars, 493,981 tons; rails, 52,458 tons. There were 323,547 tons sold by the makers in half-finished forms, as blooms, billets and ingots.

Iron and Steel Exports—The exports of iron and steel, and of machinery, from Great Britain for the eight months ended Aug. 31, are valued by the Board of Trade returns as below:

	1905.	1906.	Changes.
Iron and Steel	£20,471,662	£25,501,292	I. £5,029,630
Machinery	15,017,650	17,382,351	I. 2,364,701
New Ships	3,063,710	6,875,025	I. 3,811,315
Total	£38,553,022	£49,758,668	I. £11,205,646

The total increase was 29.1 per cent. The chief items of the iron and steel exports were, in long tons:

	1905.	1906.	Changes.
Pig iron	647,306	1,020,418	I. 373,112
Wrought iron	118,763	130,157	I. 11,394
Rails	369,496	303,995	D. 65,501
Plates	128,293	166,465	I. 38,172
Steel shapes, etc.	135,901	169,619	I. 33,718
Sheets	261,700	293,531	I. 31,831
Tin-plates	247,189	240,458	D. 6,731
All other kinds	514,438	645,633	I. 131,195

The total increase in quantities was 547,190 tons, or 22.6 per cent. Exports of pig iron to the United States were 157,760 tons, an increase of 37,209 tons; of tinplates, 34,434 tons, a decrease of 12,197 tons.

Iron and Steel Imports—Imports of iron and steel, and of machinery, into Great Britain for the eight months ended Aug. 31, are valued as follows:

	1905.	1906.	Changes.
Iron and steel	£5,335,250	£6,025,949	I. £690,699
Machinery	3,168,387	3,545,216	I. 376,829
Total	£8,503,637	£9,571,165	I. £1,067,528

The total increase was 12.6 per cent. The chief items of the iron and steel imports were, in long tons:

	1905.	1906.	Changes.
Pig iron	76,296	55,008	D. 21,288
Wrought iron	59,502	76,774	I. 17,272
Steel billets, etc.	352,648	373,405	I. 20,757
Bars and shapes	32,847	44 849	I. 12,002
Structural steel	76,975	107 192	I. 30,217
All other kinds	236,591	245,187	I. 8,596

The total increase in quantities was 67,556 tons, or 8.1 per cent., this year.

Iron Ore Imports—Imports of iron ore into Great Britain for the eight months ended Aug. 31 were, in long tons:

	1905.	1906.	Changes.
Manganiferous ores	198,881	230,920	I. 32,039
Iron ores	4,703,134	5,287,794	I. 584,660
Total	4,902,015	5,518,714	I. 616,699

Of the imports this year 143,993 tons manganiferous ore and 4,031,157 tons iron ore came from Spain.

Dusseldorf, Germany. Sept. 12.

The output of pig iron in Germany in July is reported by the Iron and Steel Union at 1,041,447 metric tons; which is 32,442 tons more than in June, and is the largest output for any month this year, except May, which exceeded it by only 6703 tons. For the seven months ended July 31 the total make was as follows, in metric tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Foundry iron	1,041,404	17.2	1,226,784	17.2
Forge iron	468,771	7.7	497,671	7.0
Steel pig	384,808	6.4	533,114	7.5
Bessemer pig	229,063	3.8	276,696	3.9
Thomas pig	3,917,447	64.9	4,581,118	64.4
Total	6,041,493	100.0	7,115,383	100.0

Steel pig includes spiegeleisen, ferromanganese, ferrosilicon and all similar alloys. The gains this year were: Foundry iron, 185,380 tons; forge iron, 28,900; steel pig, 148,306; bessemer pig, 47,633; Thomas or basic pig, 663,671; total gain, 1,073,890 tons, or 17.8 per cent. These figures point to a total of over 12,000,000 tons for the current year.

Chemicals.

NEW YORK, Sept. 26.

Copper Sulphate—Demand is steady, and prices are advancing, in accordance with the rise in copper. Quotations are $6.25 per 100 lb. for carload lots; $6.50@6.75 for smaller lots, according to size and conditions of orders.

Nitrate of Soda—No present change is reported in the market.

Sulphur—Exports of brimstone from Sicily for the seven months ended July 31, with stocks on that date, are reported as below, in tons of 1030 kg., which are used in the trade:

	1905.	1906.	Changes.
Exports, July	23,553	45,463	I. 21,910
" seven months	314,626	288,897	D. 25,729
Stocks, Aug. 1	337,777	428,784	I. 91,097

The July exports included 6415 tons to the United States in 1905, and 4605 tons in 1906; a decrease of 1810 tons.

Messrs. Emil Fog & Sons write from Messina, Sicily, under date of Aug. 31 as follows: "The 'Consorzio Obbligatorio' is now in working order, but it will take some time to smooth over the difficulties, which seem to obstruct its path. So far nobody seems content. The miners threaten to strike for an increase of wages, which their employers are unable to grant, as they only receive part payments for their brimstone. Caltanisetta claims to be made the headquarters of the Consorzio in preference to Palermo. Catania is protesting against Girgenti and Licata claiming equality of quotations. The excessive severity shown in controlling the shipment of brimstone is causing no end of annoyance and delay to merchants. One of our parcels, for instance, was kept waiting two days for permission to load and when it finally came, the steamer had already left. The rumor as to prohibition of export to America is gaining ground, but the Consorzio, in spite of our repeated inquiries, has not answered. Probably the terms of the agreement with the Union Sulphur Company are still under discussion. We fear that Mr. Frasch will stand his ground and that the Consorzio will have to give way. Meanwhile the Louisiana people are sending a cargo of 5000 tons to Marseilles, no doubt in order to bring some pressure to bear on the Consorzio. It seems an incident worthy of consideration, that the Consorzio already, after the first fortnight, raised its previous quotations. Up to now it is, however, still possible to buy from dissidents at lower prices, but, of

course, these free parcels will soon be exhausted."

British Chemical Trade—Exports of heavy chemicals from Great Britain for the eight months ending Aug. 31 were as follows, in cwt. of 112 lb. each:

	1905.	1906.	Changes.
Bleaching powder	590,897	642 576	I. 51,679
Muriate of ammonia	59,994	79,243	I. 19,249
Soda ash	956,701	1,065,834	I. 109,133
Bicarbonate of soda	291,768	256,773	D. 34,995
Caustic soda	959,867	1,035,888	I. 76,021
Soda crystals	126,392	114,525	D. 11,867
Soda sulphate	433,621	584,089	I. 150,468
Sulphuric acid	50,911	59,420	I. 8,509

Exports of copper sulphate were 53,218 tons in 1905, and 39,808 tons in 1906; a decrease of 13,410 tons.

Imports of chemicals and raw materials for the eight months were, in long tons:

	1905.	1906.	Changes.
Nitrate of potash	123,303	151,277	I. 27,974
Nitrate of soda	68,602	77,958	I. 9,356
Phosphates	280,843	308,814	I. 27,971
Sulphur	13,605	20,091	I. 6,486
Pyrites	476,850	509,549	I. 32,699

Estimating sulphur contents of pyrites at the usual figure, the total imports of sulphur were 204,345 tons in 1905, and 223,911 tons in 1906; an increase this year of 19,566 tons, or 9.6 per cent.

Metal Market.

New York, Sept. 26.

Gold and Silver Exports and Imports.

At all United States Ports in August and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1906	$ 598,078	$7,935,928	Imp. $7,337,850
" 1905	274,153	3 213 216	" 2,939,063
Year 1906	33,512,040	80,308,039	" 46,795,999
" 1905	41,265,017	24,795,910	Exp. 16,469,107
Silver:			
Aug. 1906	4,049,173	2,738,951	" 1,310,222
" 1905	4,549,485	2,517,274	" 2,032,211
Year 1906	41,847,028	29 693,485	" 12,153,543
" 1905	33,915,751	20,666,993	" 13,248,758

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending Sept. 22 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	13,891,378	$ 840,769	$ 15,333
1906	$5,964,743	66,537,231	41,957,183	1,526,395
1905	32,285,443	1,450,700	25,169,367	3,187,523
1904	72,938,564	3,882,636	28,686,568	692,459

No gold was exported for the week; imports were chiefly from London, though smaller amounts came from Paris and Cuba. Imports of silver for the week were from the West Indies and Mexico; exports were chiefly to London

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Sept. 22, gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts	$1,076,440,600	$1,043,882,600
Deposits	1,083,195,800	1,083,251,500
Circulation	53,712,300	45,109,500
Specie	200,454,400	190,536,500
Legal tenders	75,579,600	76,592,300
Total reserve	$276,034,000	$267,128,800
Legal requirements	270,798,950	255,812,875
Surplus reserve	$5,235,050	$11,315,925

Changes for the week this year were increases of $7,422,200 in loans, $13,170,000 in specie, $17,763,000 in deposits, $2,207,000 in circulation and $7,779,525 in surplus reserve; a decrease of $949,500 in legal tenders.

Gold imports continue, and the amount taken abroad on the present movement is about $40,000,000 up to date.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York	.....	.....	$190,536,500
England	$173,556,055	.....	173,556 055
France	577,299,100	$209,495,405	786,795,305
Germany	158,930,000	52,975,000	211,905,000
Spain	76,295,000	123,285,000	199,580,000
Netherlands	27,644,000	28,472,500	56,112,500
Belgium	16,936,665	8,468,335	25,405,000
Italy	149,055,000	19,276,000	168,331,000
Russia	552,395,000	28,860,000	581,255,000
Austria	234,950,000	60,060,000	295,010,000
Sweden	19,395,000	.....	19,395,000

The returns of the associated banks of New York are of date Sept. 22, and the others Sept. 21. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Exports of silver from London to the East are given by Messrs. Pixley & Abell's circular as follows, for the year to Sept. 13:

	1905.	1906.	Changes.
India	£ 4,305.121	£ 11,966.013	I. £ 7,660,892
China	753.841	280,700	D. 473,141
Straits	2,800	1,750	D. 1,050
Total	£ 5,061.762	£ 12.248.463	I. £ 7.186,701

Receipts for the week were £223,000 in bars and £30,000 in Mexican dollars from New York; a total of £253,000. Exports were £53,750 in bars and £40,400 in Mexican dollars; £94,150, all to India.

Indian exchange continues strong, the Council bills offered in London bringing an average of 16.06d. per rupee. Shipments of silver to India are decreasing for the time.

The gold and silver movement in France for the seven months ending July 31 was as follows:

Gold:	1905.	1906.
Imports	Fr. 482,265,000	Fr. 355,629,000
Exports	64.291,000	86,902,000
Excess, imports	Fr. 417,974,000	Fr. 268,727,000
Silver:		
Imports	55,222,000	91,919,000
Exports	41,677,000	74,701,000
Excess, imports	Fr. 13,545.000	Fr. 17,218,000

Imports of copper and nickel coins were 95,000 fr. in 1905, and 63,000 fr. in 1906; exports were 225,000 fr. in 1905, and 149,000 fr. this year.

The movement of gold and silver in Great Britain for the eight months ending Aug. 31 is reported as below:

Gold:	1905.	1906.
Imports	£26,768,177	£30,130,891
Exports	18,106,154	20,015,129
Excess, imports	£8,662,023	£10,115,762
Silver:		
Imports	£ 8,882,204	£13,225,068
Exports	9,509,636	14,038,388
Excess, exports	£ 627,432	£ 813,320

The Director of the Mint on Sept. 26, purchased 100,000 oz. silver at 68.76c. delivered at the Denver Mint.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.52¾	$0.55
Peruvian soles and Chilean	0.48	0.51½
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
20	4.83½	68⅛	31 7/16	24	4.83½	68⅛	31¾
21	4.83½	68	31½	25	4.83½	68¾	31 11/16
22	4.83½	68⅜	31 11/16	26	4.83½	68¾	31 11/16

New York quotations are for fine fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Sept.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
20	19¼ @19⅜	18 15/16 @19⅛	88	40½	5.75	6.30 @6.35	6.15 @6.20
21	19¾ @19⅝	19 @19 3/16	88½	40½	5.75	6.30 @6.35	6.15 @6.20
22	19½ @19¾	19 1/16 @19¼	.....	40½	5.75	6.30 @6.35	6.15 @6.20
24	19¾ @20	19¼ @19⅜	89¾	40½	5.75	6.30 @6.35	6.15 @6.20
25	19¾ @20	19¼ @19¾	90¼	40½ @40¾	5.75	6.30 @6.35	6.15 @6.20
26	19¾ @20	19¾ @19¾	90⅜	40½ @40¾	5.75	6.30 @6.35	6.15 @6.20

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The market is in an exceedingly strong position. Producers are well sold up for some months to come, and are unable to fill orders for nearby shipment. Belated buyers who require their material at an early date are compelled to pay fancy prices, while future shipments can still be obtained at more reasonable rates. Under the circumstances, it is rather difficult to gage the market. It is believed that the production this year will show far less than the normal increase, while on the other hand consumption the world over has enlarged at an astonishing rate. Prices have advanced from day to day and close very firm at 19¾@20c. for Lake, 19⅜@19¾c. for electrolytic in ingots, cakes and wirebars; while 19@19¼ represents the average at which business

was done in casting copper during the week.

The sulphate manufacturers in Europe report very heavy business, and are drawing heavily upon the supplies from Chile. On this account the quantities available for the standard market are much reduced. Prices continue very strong, closing at £90 7s. 6d. for spot, and £90 6s. 3d. for three months.

Refined and manufactured sorts we quote: English tough, £93 10s.@£94 10s.; best selected, £94 10s.@£95 10s.; strong sheets, £100@£101.

Imports of copper and copper material into Great Britain, with exports of copper, were as follows for the eight months ending Aug. 31; the total imports given being the copper contents of all material:

	1905.	1906.	Changes.
Copper ore	58,288	62,460	I. 4,172
Matte and precipitate	43,148	49,104	I. 5,956
Fine copper	47,307	49,319	I. 2,012
Total copper	74,710	80,117	I. 5,407
Re-exports	7,340	10,351	I. 3,011
Exports	30,863	27,285	D. 3,578
Total exports	38,203	37,636	D. 567
Balance	36,507	42,481	I. 5,974

Of the imports the United States furnished 3417 tons of matte and 21,350 tons of fine copper in 1905; 3765 tons of matte and 17,431 tons of fine copper in 1906; showing an increase of 348 tons of matte and a decrease of 3919 tons copper

Copper Sheets—The leading manufacturers, Sept. 20, advanced their prices 1c. per lb. on sheet copper, which brings the base price up to 24 cents.

Tin—While business has been of small proportions, it is sufficiently large to take care of whatever supplies are coming on the market. A firmer tone has made itself felt in London, where prices close at an advance, the spot quotation being cabled at £185 15s., and three months at £185. Quotations here have advanced in proportion and at the close are higher, being 40½@40¾c.

Imports and exports of tin in Great Britain for the eight months ending Aug. 31 were, in long tons:

	1905.	1906.	Changes.
Straits	20,657	24 618	I. 3,961
Australia	2,605	2,945	I. 340
Other Countries	1,570	2,066	I. 496
Total imports	24,832	29,629	I. 4.797
Re-exports	18,943	22,094	I. 3,151
Exports	5,101	5,538	I. 437
Total exports	24,044	27,632	I. 3,588
Balance	788	1 997	I. 1,209

The re-exports are largely of Straits tin sent to the United States.

Lead—The market continues at 5.75 New York, and good-sized transactions are reported from day to day.

The recent advance has been well sustained in London, where prices close unchanged at £18 10s. for Spanish lead, £18 11s. 3d. for English lead.

Imports and exports of lead in Great Britain for the eight months ending Aug. 31 were as below, in long tons:

	1905.	1906.	Changes.
United States	17,694	12,970	D. 4,724
Spain	70,702	75,740	I. 5,038
Australia	49.965	35,841	D. 14,124
Germany	12,753	11,992	D. 761
Other countries	1,635	2,422	I. 787
Total imports	152,749	138,965	D. 13,784
Exports	27,563	30,608	I. 3,045
Balance	125,186	108,357	D. 16,829

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

St. Lous Lead Market—The John Wahl Commission Company telegraphs us as follows on Sept. 26: Lead is quiet, with sales at 5.82½c. for ordinary Missouri lead and 5.95@6c. for Missouri corroding brands.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 8, that the market has been strong. Pig lead is 81.75 reales per quintal, silver being paid for at 13.75 reales per ounce. Exchange is 28.02 pesetas to £1. The price of lead, on current exchange, is equal to £16 6s. 7d. f.o.b. Cartagena. Exports for the week were 10 tons desilverized lead to Hamburg; 300 tons desilverized to Antwerp; 283 tons argentiferous to Marseilles; 1321 tons argentiferous to London.

Spelter—The activity in this metal has subsided. However, prices have so far not suffered and at the close are quoted at 6.15@6.20 St. Louis, 6.30@6.35 New York.

Reports from abroad indicate a very strong market, with supplies at low ebb. The close is firm and higher at £27 15s. for good ordinaries, £28 for specials.

Imports and exports of spelter in Great Britain for the eight months ending Aug. 31 were as follows, in long tons:

	1905.	1906.	Changes.
Spelter	55,982	59,588	I. 3,606
Zinc sheets, etc	13.456	12.800	D. 656
Total imports	69.438	72,388	I. 2,950
Exports	5,384	5,068	D. 316
Balance, exports	64,054	67,320	I. 3.266

Imports of zinc ore are not reported separately.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 8, that there is no change in the market. Shipments for the week were 550 tons blende to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—The market is somewhat firmer, the prices quoted for this year's delivery ranging between 22@22½ for ordinary brands, while 24c. is quoted for Hallett's and 24½c. for Cookson's.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—The price continues $33 per oz. unmanufactured and $24 for scrap metal.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 per flask, while jobbers are asking £16 18s. 9d.

Imports of quicksilver into Great Britain for the eight months ending Aug. 31 were 2,526,676 lb. in 1905, and 2,797,201 lb. in 1906; an increase of 270,525 lb. Re-exports of imported metal were 1,081,342 lb. in 1905, and 1,370,287 in 1906; an increase of 288,945 lb. this year.

Aluminum—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Missouri Ore Market.

JOPLIN, Sept. 22.

The highest price reported paid for zinc was $47 per ton, the assay basis price quoted by buyers being $40@43 per ton of 60 per cent. zinc; the average price was $41.96.

The highest price paid for lead was $82.50 per ton, medium grades selling at $77@81 per ton. The average price of all grades was $79.86.

The assay quotation of the purchasing agents is no criterion of prices, it being one of those periodical occasions when an effort is made to keep part of the sellers in the dark about prices. This is said advisedly, for not only is the high price paid, but other sales are reported at prices equivalent to a higher basis, at least one offer being equal to a basis price of $45 per ton of 60 per cent. zinc. The Mineral Point Zinc Company has entered the local market for a supply of ore for the new works in course of construction at DePue, Illinois. The St. Louis Smelting and Refining Company is shipping about two-thirds of the output of lead, but it is necessary to maintain strong prices to se-

cure such a large proportion of the tonnage.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,229,620	1,013,210	$ 88,463
Joplin	2,802,950	410,290	78,077
Galena-Empire	1,404,130	91,790	32,457
Duenweg	859,960	159,760	24,878
Prosperity	347,930	246,880	17,355
Alba	558,540	4,850	12,761
Badger	497,630	.....	11,197
Granby	592,000	15,000	10,100
Aurora	382,030	50,580	8,280
Oronogo	369,680	.....	8,146
Spurgeon	200,370	43,640	4,750
Neck City	190,970	.....	4,296
Carthage	168,990	.....	3,788
Sherwood	102,560	26,910	3,241
Baxter Springs	175,830	.....	2,965
Stott City	63,790	.....	1,539
Totals	10,946,980	2 061,910	$312,093
38 weeks	401,915,300	56,527,320	$10,876,531

Zinc value, the week, $229,757; 38 weeks, $8,713,734.
Lead value, the week, 82,336; 38 weeks, 2,162,797.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58 27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Sept. 22.

The price of ore has been a little off, it is claimed, due to the lessening of the demand since the Lanyon fire at Iola; otherwise, the market continues satisfactory, all the ore available being sold and most of it loaded. There were few transactions of any note aside from the sale of the Dall ore, which again brought top price.

Lead continued firm at $33@37.50 per thousand; drybone $4@$18.50; sulphur, $3@6; zinc, 60 per cent., $43.50@44.

The camps of the Platteville district loaded ore as follows for the week ending Sept. 22:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	654,640	.....	.....
Highland	402,850	....	....
Mineral Point	273,500	.....	.....
Linden	265,040	.....	.....
Cuba City	257,430	.....	.....
Benton	197,600	.....	.....
Livingston	100,710	.....	.....
Rewey	63,000	.....	.....
Total for week	2,214,770	.....	.....
Year to Sept. 22	53,758,656	2,554,550	2,840,110

Producers are adapting themselves to the local conditions, and since cooler weather has set in, the floating labor is beginning to settle down preparing for a winter's stay, thus improving the labor conditions somewhat.

Mining Stocks.

NEW YORK, Sept. 26.

The stock market continues to be uncertain, and would be puzzling, if inside operations were not so plainly in evidence. Outside of the professional element and the small following which never leaves it, it looks as if only a moderate interest is taken. Amalgamated Copper, which is usually the leader, fluctuated in a meaningless fashion, closing at $114½, though business conditions are better than seven months ago, when it was quoted at $118. Tennessee Coal and Iron sold up to $159; United States Steel closed at $45½ for the common and $107 for the preferred. There was one sale during the week of Homestake of South Dakota, 50 shares at $90 per share; this is $6 above the last quoted price.

On the curb Nipissing has quieted down, transactions being much smaller, and the closing price $17. Nevada-Utah Mining and Smelting led the market, selling 45,000 shares in one day at $5@5½. Gold Hill, which has been quiet for a long time, was brought out, selling today 24,000 shares, and closing at $5¼. Boston Copper was fairly active around $32½, and Cumberland Ely at about $11 per share.

On the Consolidated Exchange Tonopah Extension brought $6, and Portland, of Cripple Creek, $1.30. The dealing in Comstocks was light; $1.10 was paid for Hale & Norcross, and 87@88c. for Consolidated California & Virginia.

The prospect is for high rates on money which will not help the speculative market.

Boston. Sept. 25.

There has been a continuation of the good feeling in mining shares and business has been of good volume. The movement in copper securities continues to broaden and to strengthen. Prices are higher throughout the list and many important advances have been recorded. Not since the boom of 1898 and 1899 have shares of this kind shown such inherent strength as at the present time. Old Dominion has had the most marked advance, selling up $8.75 to $54.87½, with reaction to $52 tonight. A general reaction followed in the whole list late today on the apparent disappointment in the 12½ cent increase in the Anaconda dividend to $1.50 quarterly. A reaction was due in the market and this excuse came at an opportune time. Osceola, which touched $122.50, broke to $115 today on the report of a fire at the mine, but this was offset by buying orders from the Lake which caused a recovering to $118.

Franklin Mining was favored by striking the Pewabic lode which caused the price to advance $4.37½ to $25.87½, reacting to $24.50 today on information that the trammers had gone out on a strike. Tecumseh rose $2 to $15 and Rhode Island $1 to $6, both contiguous properties. Acadian spurted $4, touching $7.25, today reacting to $6. The possibilities of this property are now considered good. Greene touched $29.12½, but is off to $27 tonight. Mr. Ryan of the Amalgamated denies that he is to go on the board of the Greene. Bingham advanced $1.62½ to $37.62½ on heavy buying, but reacted to $35 tonight. Shannon has made good to its sponsors, being up $2.37½ to $13. London and New York have been large buyers of the stock—as a result of Mr. Amster's trip abroad—taking the stock up and paying for it. Amalgamated made a new record on this move, touching $115.37½ but ran back to $112.75 tonight. Boston Consolidated sold up $2.25 to $33.50 on New York buying. Trinity touched $12, again and Utah rose to $66.50 with a $2 reaction. Butte Coalition has shown more activity and after advancing to $38.50 settled to $36.75. North Butte is off $2 for the week to $97.

The curb has also been exceedingly active for mining shares. Nipissing sold up $3.50 to $18.62½ on the dividend declaration.

Colorado Springs. Sept. 22.

There has not been much excitement on the local exchange during the past week, but prices have held firm, with a slight tendency to increase. Portland has recovered from $1.25 to $1.35. The cause of the slump was the throwing on the market of a large block of stock by former President Burns.

San Francisco. Sept. 20.

Business continues to improve, and dealings are more active, especially in the southern Nevada stocks. On the oil exchange also, more business is being done.

Judge Waste, of Oakland, has given a decision of considerable importance to those who owned mining stock that was destroyed in the San Francisco fire. He made an order directing the officers of the Central Eureka Mining Company, of Amador county, to duplicate stock so destroyed. This company is one of the rich corporations, and its shares are worth from $2 to $2.50 each. Many of these shares were destroyed in the fire and the shareholders employed Attorney De Golia to bring a friendly suit under the new law to have their shares reissued. There was no contest. De Golia simply offered proof of the ownership of the stock and Judge Waste gave judgment for the plaintiffs. Among them are Dr. J. H. O'Connor, S. J. Gardner, Walter Morgan, Alice L. Jordan, W. T. Green, J. H. Spring, Colonel A. Andrews, and C. H. Lamberton. Large numbers of certificates of shares in Nevada mines were lost, not only by brokers who had them in their safes, but by the owners themselves. Under the new law, passed by the last legislature, it is a simple matter to get a reissue of the burned certificates.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 25

Name of Company.	High	Low	Clg.	Sales
Amalgamated*	115⅜	112⅜	115⅜	482,140
Anaconda*	294½	283	294½	128,600
British Col. Copper	10⅞	10¼	10¾	20,300
Butte Coalition*	38½	36½	37¾	9,235
Cum. Ely Mining	11¼	9⅜	10¾	68,100
Greene Gold	2¼	2	2⅛	1,790
Greene Gold & Silver	2¼	1⅝	2	6,365
Guanajuato	5⅜	4⅞	5	425
Micmac	5⅜	5	5¼	21,150
Mines Co. of Am	1.50	1.22	1.50	49.500
Mitchell Mining	5⅛	4¾	5	51,940
Mont. Sho. Con. (New)	13½	12½	13¼	11,120
Nev. Utah M. & S.	5⅛	4	5½	109,300
Nipissing Mines	18⅝	15	18½	353,300
Tennessee Copper	45	42	42½	3,240
Union Copper	1¾	1¼	1¾	21,900
Utah Apex	8⅝	7⅛	8⅝	1,900

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	156½	153⅝	155⅞	66,600
Am. Smelt. & Ref., Pf.	115⅝	115⅜	115½	2,100
Bethlehem Steel	25	25	25	200
Colo. Fuel & Iron	57¾	55	56½	18,510
Federal M. & S., Pf.*	94½	93	93¾	600
Inter. Salt*	40	39½	40	....
National Lead	80½	78	79¾	11,000
National Lead, Pf	101¾	101½	101¾	1,000
Pittsburg Coal	14⅛	14⅛	14⅛	100
Republic I. & S.	40⅛	36¾	38½	33,310
Republic I. & S., Pf.	100	98¾	98¾	3,500
Sloss-Sheffield	75	74½	74½	300
Tenn. C. & I.	159	157⅛	159	400
U. S. Red. & Ref	35¼	34	35¼	200
U. S. Red. & Ref., Pf.				
U. S. Steel	45⅝	44½	45⅝	384,850
U. S. Steel, Pf.	107⅞	106¾	106⅞	18,162
Va. Car. Chem	41¾	40	40	2,000

BOSTON.

Adventure	6¼	6	6¼	350
Allouez	37⅛	36	36	1,105
Atlantic	12¼	11⅞	12	680
Bingham	37¾	35	36¼	21,210
Boston Consolidated	33½	31½	33½	13,596
Calumet & Arizona*	121	118¾	119	1,779
Calumet & Hecla*	785	770	785	98
Centennial	25½	24	24½	875
Copper Range	80¼	78	79⅛	8,926
Daly-West	18¼	17½	17½	1,658
Franklin	25⅞	21½	24¾	31,138
Granby*	13⅛	12¼	13⅛	3,960
Greene Consolidated*	28⅛	27	27¾	15,962
Isle Royal	22¼	20	20¼	550
Mass	9⅛	9	9	460
Michigan	15	14	15	2,455
Mohawk	64⅛	63	64	1,195
Mont. Coal & Coke rcts.	2½	2¼	2⅜	1,060
Nevada	20⅞	19	20	22,248
North Butte*	99¼	97	99	23,166
Old Dominion	54⅞	47¼	53½	33,564
Osceola	121⅛	119¼	120	1,203
Parrot*	29	27½	27¾	827
Quincy*	96	94	95¾	315
Rhode Island	6	5	5⅞	4,555
Shannon	13	10⅝	13	36,260
Tamarack	100	93	93	16
Tecumseh	15	13	14⅞	10,255
Trinity	12	10	11¾	10,280
United Copper, com.	68	65¾	68	5,050
U. S. Oil	10¾	10	10⅛	1,735
U. S. Smg. & Ref.	62	60½	62	6,714
U. S. Smg. & Ref., pfd.	48¾	46	47½	4,873
Utah Copper	66⅝	64⅛	65½	13,167
Victoria	7¼	7	7	445
Winona	9¾	8¾	9	885
Wolverine	150	147	148	200
Wyandotte	1.25	.75	1.25	283

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 27⅞—26; Comstock, .19—.19; Davis-Daly Est., 10¾—10⅛; Gold Hill, 5¾—2½; Gugg. Exp., 295—280; Rich. Eureka, 7¾—7⅛; Standard Oil, 606—600. (Boston) Ahmeek, 87½—85; Am. Zinc, 15—14½; Arcadian, 7¼—3½; Ariz. Com'l, 40½—38; Black Mt., 9⅜—8; Cananea, 19½—18⅞; East Butte, 10¼—9¾; Keweenaw, 11¾—10½; Majestic, 2¼—1½; Raven, .92—.82; Shawmut, 1.00—.80; Superior Cop., 18—17; Superior & Pitts., 20½—19½; Troy, 1⅝—1½.

PHILADELPHIA. Sept. 25.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7	7	7	715
Cambria Steel	38½	37⅞	38⅛	2,921
General Asphalt	9⅛	8½	9⅛	....
Penn. Steel, pd	108	106	106¾	13
Philadelphia Co.	50½	48½	50½	1,820
Tonopah Mining	18½	17⅞	18½	1,445

PITTSBURG. Sept. 25.

Crucible Steel	12⅛	12¼	12¼	803
Crucible Steel, Pf.	79⅛	78	78⅛	173
Harbison-Walker Ref.	14	13	14	75
Ohio Tonopah	.28	.26	.28	2,745
Tonopah Ext	7	5½	6⅛	12,541

COLORADO SPRINGS. Sept. 29.

Name of Company.	High	Low	Clg	Sales
Acacia	13½	13	13	10,000
Dante	5⅛	5	5	4,000
C. C. Con	6⅛	6¼	6½	....
Doctor Jack Pot	8¾	8⅛	8⅛	6,100
Elkton	49¾	48¼	49¾	12,000
El Paso	53½	52	53	5,000
Findley	75	75	75	2,500
Gold Dollar	8¼	7⅞	7⅞	10,350
Gold Sovereign	6⅝	6⅛	6½	16,000
Isabella	20	19½	20	5 000
Jennie Sample	9¾	9	9¼	12,330
Mary McKinney	66	65	66	4,500
Portland	1.35	1.23	1.35	2,400
United Gold Mines	11	10	11	14,500
Vindicator	95	94	94	900
Work	16¾	16¼	16½	11,000

SAN FRANCISCO. Sept. 19.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.90	.84	.90	200
Caledonia	.30	.22	.29	2,000
Challar	.13	.10	.13	3 600
Con. Cal. & Va	.89	.85	.88	3 500
Crown Point	.08	.05	.08	1,900
Gould & Curry	.24	.18	.23	3,100
Hale & Norcross	1.10	.96	1.10	1,100
Mexican	.73	.69	.71	1,750
Ophir	2.85	2.70	2.70	1,200
Overman	.10	.08	.10	1,400
Potosi	.15	.11	.14	1,200
Savage	1.40	.99	1.35	3,300
Sierra Nevada	.33	.30	.32	4,600
Bullfrog Mining	.50	.45	.50	4 900
Diamondfield	.39	.36	.36	19,700
Goldfield of Nevada				
Jim Butler	1.40	1.37	1.40	7,200
Jumping Jack	.56	.51	.54	15,000
Kendall	.76	.65	.73	3,000
MacNamara	.87	.73	.80	13,000
Manhattan Dexter	.76	.57	.61	2,450
North Star	.50	.46	.50	3,100
Original Bullfrog	.16	.13	.14	2,000
Tonopah Belmont	6.00	5.85	6.00	....

Tonopah Stocks. Sept. 26.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18.50	18.25	18.50
Tonopah Montana	2.95	2.92	2.94
Tonopah Extension	6.00	5.75	5.75
Tonopah Midway	2.28	2.26	2.27
Tonopah West End	2.65	2.60	2.60
Goldfield Mining Co.	.67	.65	.66
Jumbo Mining	1.50	1.47	1.48
Red Top	1.55	1.50	1.48
Sandstorm	.71	.68	.70
Montgomery Shoshone Cons	13.25	13.12½	13.25

St. Louis. Sept. 21.

Adams, $0.40 — $0.25; American Nettie, $0.08—$0.07; Center Creek, $2.40—$2.10; Central Coal and Coke, $64.25—$63.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$58.00; Columbia, $4.00—$3.80; Con. Coal, $25.00—23.50; Doe Run (old stock), $350.00—$300.00; Granite Bimetallic, $0.25—$0.22; St. Joe (old stock), $32.00—$30.00.

LONDON. *(By Cable.*)* Sept. 26.

Dolores, £1 16s. 3d.; Stratton's Independence, £0 4s. 0d.; Camp Bird, £1 5s. 9d.; Esperanza, £3 6s. 10½d.; Tomboy, £1 8s. 9d.; El Oro, £1 8s. 1½d.; Oroville, £0 19s. 6d.; Somera, £0 6s. 10½d.; Uath Apex, £1 15s. 0d.; Ariz. Copper, pref., £3 9s. 9d.; Ariz. Copper, def., £3 8s. 3d.

New Dividends.

Company.	Payable.	Rate.	Amt.
Am. Agricul. Chem., pfd	Oct. 1	$3.00	$544,490
Elkton Con	Sept 24	0.00½	15.000
El Paso	Sept. 21	0.01	25,000
Homestake, S. Dak	Sept. 25	0.50	169,200
International Nickel, pfd.	Nov. 1	1.50	131,123
Mines Co. of America	Sept. 22	0.05	100,000
New Idria, Cal	Oct. 1	0.24	20,000
Nipissing Mines	Oct. 20	0.25	300,000
North Star Mines	Sept. 28	0.20	80,000
Standard Con., Cal	Oct. 15	0.15	26,759
Tenn. Coal. Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal Iron & R.R., pfd.	Nov. 1	2.00	4,960
Tezuitlan Copper	Oct. 1	2.00	20,000
Tonopah Midway	Oct. 1	0.05	50,000
Westmoreland Coal	Oct. 1	2.50	150,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Hale & Norcross, Nev.	Oct. 2	Oct. 25	$0.10
Headlight, Idaho	Oct. 10	Nov. 12	0.01
Jennie Lind, Cal.	Oct. 8	Oct. 24	0.04
Navajo	Sept 29	Oct. 22	0.05
North Belle Isle	Sept. 29	Oct. 22	0.05

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

Month.	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18 419	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18 688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	18.190	15.005	18.585	66.887	81.167
Aug.	15.664	18.380	15.725	18.706	69.830	83.864
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	...	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	..	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	37.275
Feb.	29.262	36.403	August	32.866	40.606
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	....
June	30.329	39.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	5.750
Feb.	4.450	5.464	Aug.	4.665	5.750
March	4.470	5.350	Sept.	4.850	.....
April	4.500	5.404	Oct.	4.850	.....
May	4.500	5.685	Nov	5.200	.....
June	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16,850 per long ton; February, £16,031; March, £15,922; April, £15,959; May, £16,725; June, £16,813; July, £16,525; August, £17,109.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.728
July	5.396	6.006	5.247	5.856	23.938	26.800
Aug.	5.706	6.027	5.556	5.878	24.675	26.938
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov	6.145	.....	5.984	....	28.500	.....
Dec.	6.522	.....	6.374	...	28.719	....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.